

#### TEST REPORT

#### ST/SG/AC.10/11 Rev.5/Amend.1 Section 38.3

# AMENDMENTS TO THE FIFTH REVISED EDITION OF THE RECOMMENDATIONS ON THE TRANSPORT OF DANGEROUS GOODS, MANUAL OF TEST AND CRITERIA

(Section 38.3: Lithium batteries)

Report reference No. ...... STR12128435S

Tested by (name+ signature) .......... Anne Ma

Approved by (+ signature) ...... Ailis Ma

Date of issue ...... Jan. 10, 2013

Testing laboratory ...... SEM.Test Compliance Service Co., Ltd.

District, Shenzhen, P.R.C. (518101)

Testing location ...... As above

Applicant ...... GlobTek, Inc.

Manufacturer ...... GlobTek (Suzhou) Co., Ltd.

Address ...... Building 4, No. 76 Jin Ling East Rd., Suzhou Industrial Park,

Suzhou, JiangSu 215021, China

Standard ...... ST/SG/AC.10/11 Rev.5/Amend.1 Section 38.3

Test procedure ...... Type approved

Procedure deviation ...... N.A.

Non-standard test method ...... N.A.

This test report is specially limited to the above client company and product model only, it may not be duplicated without prior written consent of SEM. Test.

Product Name ...... Li-ion Battery Pack

Trademark ..... -

Model/type reference ...... BL1800P0639602S1PPLB

Ratings ...... 7.4V, 13.32Wh (1800mAh)

Max. charge voltage ...... 8.4V

Max. charge current ...... 1800mA

Standard charge current ...... 360mA



Max. discharge current:	1800mA	
Standard discharge current:	360mA	
Overcharge protection voltage:	8.4V	
Over discharge protection voltage:	6.0V	
Shape of cell	☐ Cylindrical cell ☐ Prismatic cell	(greater than 20mm in diameter) (not more than 20mm in diameter)
	☐ Coin cell/Buttor ☐ Pouch cell	n ceil
Particulars: test item vs. test requi		
Classification		☐ Lithium metal batteries ☐ Lithium metal cells ☐ Lithium ion batteries
Samples Type	:	☐ Lithium ion cells ☐ Large battery ☐ Large cell ☑ Small battery
Dimension		☐ Small cell ☐ Single cell battery L: 61.5mm W: 42.0mm T: 14.0mm
Mass of apparatus		75.0g
Possible test case verdicts:	7	
- test case does not apply to the test	object	N(.A.)
- test object does meet the requireme	ent:	P(ass)
- test object does not meet the requir	ement:	F(ail)
Testing:		
Date of receipt of test item	:	Dec. 25, 2012
Date(s) of performance of test	:	Dec. 25, 2012 to Jan. 10, 2013
Test Conclusion:		
	tions on the Transp	ording to Section 38.3 of Amendments to the Fifth ort of Dangerous Goods, Manual of Test and



	<del></del>	51/5G	AC.10/11	Rev.5/Ame	na.1 Se	1		
Clause	Requiremen	t – Test		Resu	lt - Remark	Verdict		
38.3.4	Procedure					Р		
	Test 1 to 5 m same cell or		nducted in s	sequence on	the			Р
	Test 6 and 8 tested cells c	should be or batterie	S.					Р
	previously us	Test 7 may be conducted using undamaged batteries previously used in tests 1 to 5 for purposes of testing on cycled batteries.						
38.3.4.1	Test 1: Altitu	ude Simu	lation					P
38.3.4.1.1	Purpose							Р
	This test sim conditions.	is test simulates air transport under low-pressure						-
38.3.4.1.2	Test procedu	ire					7	Р
	stored at a pr	ressure			11.6 kPa		-	
	ambient temp	oerature (	20 ± 5°C)		<b>24</b> ℃		-	
	Stored times	( ≥ 6 hou	≥ 6 hours)				7	-
38.3.4.1.3	Requirement	equirement				7		Р
	Cells and bat leakage, no v no fire and if or battery aft voltage imme requirement cells and bat	venting, n the open er testing ediately p relating to	o disassemb circuit voltag is not less the rior to this pro o voltage is r	oly, no ruptui ge of each to han 90% of i ocedure. Th not applicable	re and est cell ts e	disassemb and no fire testing is no 90% of its	y prior to this	P
				of Test Ba	ttery (g)		OCV (V)	I
Group		No.	M1 (before the test)	M2 (after the test)	Mass Loss lin (0.2%	nit (before	OCV2 e (after the	OCV (≥90%)
		01	74.580	74.575	0.007%	8.380	8.378	99.976%
	t first cycle, in	02	73.546	73.543	0.004%	6 8.391	8.388	99.964%
fully charge	d states)	03	74.936	74.935	0.001%	6 8.388	8.385	99.964%
		04	74.719	74.718	0.001%	6 8.393	8.391	99.976%
		05	75.207	75.205	0.003%	6 8.387	8.385	99.976%
Group B (at cycles endi		06	74.857	74.856	0.001%	6 8.393	8.391	99.976%
charged sta		07	74.863	74.861	0.003%	6 8.395	8.394	99.988%
		08	73.141	73.138	0.004%	6 8.389	8.385	99.952%

# Remark

- 1. Mass loss (%)=(M1-M2)/M1\*100% (Where  $M_1$  is the mass before the test and  $M_2$  is the mass after the test).
- Leakage means the visible escape of electrolyte or other material from a cell or battery or the loss of material (except battery casing, handling devices or labels) from a cell or battery such that the loss of mass exceeds the values in Table.
- 3. The OCV of each test cell after testing is not less than 90% of its voltage immediately prior to this procedure.
- 4. Ambient temperature: 24°℃

### Conclusion:

Li-ion Battery Pack had passed altitude simulation test.



	T	51/5G	5/AC.10/11	Rev.5/Ame	ena.1 Se	CTIO	n 38.3		
Clause	Requirement – Test						Result -	Remark	Verdict
38.3.4.2	Test 2: Ther	Fest 2: Thermal Test							Р
38.3.4.2.1	Purpose								-
	internal elect	This test assesses cell and battery seal integrity and internal electrical connections. The test is conducted using rapid and extreme temperature changes.							-
38.3.4.2.2	Test procedu	ire							Р
	Test tempera	ature and	stored hours	8			72±2°C,≥6 40±2°C,≥		-
	The maximur	m time int	erval				ween test tremes is 30	temperature ) minutes.	<u> </u>
	Test times					rep	eated 10 ti	mes	-
	for 24 hours	at ambier	test cells and batteries are to be stored t ambient temperature ( $20\pm5^{\circ}$ C)				<b>24</b> ℃		
			and batteries the duration of exposure erature extremes should be at least 12				Small battery		N
38.3.4.2.3	Requirement	atteries meet this requirement if there is no venting, no disassembly, no rupture and if the open circuit voltage of each test cell fter testing is not less than 90% of its nediately prior to this procedure. The t relating to voltage is not applicable to test				No leakage, no venting, no disassembly, no rupture and no fire. Battery after testing is not less than 90% of its voltage immediately prior to this procedure.			Р
	leakage, no version of fire and if or battery after voltage immediates.								P
	1			of Test Ba	ttery (g)			OCV (V)	
Group		No.	M1 (before the test)	M2 (after the test)	Mass Loss lin (0.2%	nit	OCV1 (before the test)	OCV2 (after the test)	OCV (≥90%)
		01	74.575	74.500	0.1019	6	8.378	8.285	98.890%
Group A (at	first cycle, in	02	73.543	73.455	0.120%	6	8.388	8.299	98.939%
fully charge		03	74.935	74.851	0.1129	6	8.385	8.256	98.462%
		04	74.718	74.641	0.103%	6	8.391	8.245	98.260%
	4	05	75.205	75.115	0.120%	6	8.385	8.212	97.937%
Group B (at		06	74.856	74.785	0.095%	6	8.391	8.255	98.379%
cycles endi		07	74.861	74.789	0.096%	6	8.394	8.245	98.225%
onarged states)		08	73.138	73.052	0.118%	6	8.385	8.261	98.521%

#### Remark

- 1. Mass loss (%)=(M1-M2)/M1\*100% (Where  $M_1$  is the mass before the test and  $M_2$  is the mass after the test).
- Leakage means the visible escape of electrolyte or other material from a cell or battery or the loss of material (except battery casing, handling devices or labels) from a cell or battery such that the loss of mass exceeds the values in Table.
- 3. The OCV of each test cell after testing is not less than 90% of its voltage immediately prior to this procedure.
- 4. Ambient temperature: 24°C

# Conclusion:

Li-ion Battery Pack had passed thermal test.



1		ST/SG	6/AC.10/11	Rev.5/Ame	end.1 Se	ctic	on 38.3		
Clause R	Requiremen	t – Test			Result -	Remark	Verdict		
38.3.4.3 T	est 3: Vibra	tion					Р		
38.3.4.3.1 P	Purpose								Р
Т	his test simulates vibration during transport.							-	
38.3.4.3.2 T	Test procedure								Р
0 S	Cells and bat of the vibration of the manner	n machir er as to fa	ne without di aithfully trans	storting the o	cells in ation.				-
	he vibration ogarithmic.	shall be	a sinusoidal	waveform w	rith a				P
С	Ouration					15	min		-
F	requency ra	nge				7H	lz200Hz.	7Hz	-
	mplitude					0.8	3mm		-
h	ours for eac	hall be repeated 12 times for a total of 3 ch of three mutually perpendicular sitions of the cell.							-
	Requirement							Р	
le n o v re	Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, 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.							Р	
·			Mass M	of Test Ba	ttery (g)			OCV (V)	
Group		No.	M1 (before the test)	M2 (after the test)	Mass Loss lim (0.2%)	nit	OCV1 (before the test)	OCV2 (after the test)	OCV (≥90%)
		01	74.500	74.488	0.016%	6	8.285	8.281	99.952%
Group A (at fir	st cycle, in	02	73.455	73.451	0.005%	6	8.299	8.295	99.952%
fully charged s	states)	03	74.851	74.845	0.008%	6	8.256	8.251	99.939%
		04	74.641	74.635	0.008%	6	8.245	8.241	99.951%
	4	05	75.115	75.105	0.013%	6	8.212	8.202	99.878%
Group B (after		06	74.785	74.781	0.005%	6	8.255	8.251	99.952%
cycles ending charged states		07	74.789	74.785	0.005%	6	8.245	8.241	99.951%
= '	· / >	08	73.052	73.048	0.005%	6	8.261	8.251	99.879%

#### Remark

- 1. Mass loss (%)=(M1-M2)/M1\*100% (Where  $M_1$  is the mass before the test and  $M_2$  is the mass after the test).
- 2. Leakage means the visible escape of electrolyte or other material from a cell or battery or the loss of material (except battery casing, handling devices or labels) from a cell or battery such that the loss of mass exceeds the values in Table.
- 3. The OCV of each test cell after testing is not less than 90% of its voltage immediately prior to this procedure.
- 4. Ambient temperature: 24°C

#### **Conclusion:**

Li-ion Battery Pack had passed vibration test.



		ST/SG	JAC.10/11	Rev.5/Ame	end.1 Se	ction 38.3		
Clause	Requirement – Test						lt - Remark	Verdict
38.3.4.4	Test 4: Shoo	k				Р		
38.3.4.4.1	Purpose					Р		
	This test sime	simulates possible impacts during transport.						-
38.3.4.4.2	Test procedu	Test procedure						Р
	Test cells and machine by rall mounting	neans of	a rigid moun	This is sma	all batteries.	-		
	a half-sine sh	ock of pe	eak accelera	tion		150 g <sub>n</sub>		<u> </u>
	Pulse duration	n				6ms		_
	the positive of	lirection f	ollowed			three times	shocks	-
	in the positive negative dire	Each cell or battery shall be subjected to three shocks in the positive direction followed by three shocks in the negative direction of three mutually perpendicular mounting positions of the cell or battery for a total of 18 shocks.					Dy'r	-
38.3.4.4.3	Requirement	nent						Р
	leakage, no v no fire and if or battery afte voltage imme requirement	Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, 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.						
				of Test Ba	ttery (g)		OCV (V)	
Group		No.	M1 (before the test)	M2 (after the test)	Mass Loss lim (0.2%)	`	e (after the	OCV (≥90%)
		01	74.488	74.485	0.004%	8.281	8.278	99.964%
Group A (at	first cycle, in	02	73.451	73.448	0.004%	8.295	8.285	99.879%
fully charged	d states)	03	74.845	74.844	0.001%	8.251	8.245	99.927%
		04	74.635	74.632	0.004%	8.241	8.235	99.927%
	4	05	75.105	75.102	0.004%	8.202	8.199	99.963%
Group B (aft		06	74.781	74.776	0.007%	8.251	8.245	99.927%
cycles endin		07	74.785	74.782	0.004%	8.241	8.240	99.988%
		08	73.048	73.046	0.003%	8.251	8.245	99.927%

#### Remark

- 1. Mass loss (%)=(M1-M2)/M1\*100% (Where  $M_1$  is the mass before the test and  $M_2$  is the mass after the test).
- 2. Leakage means the visible escape of electrolyte or other material from a cell or battery or the loss of material (except battery casing, handling devices or labels) from a cell or battery such that the loss of mass exceeds the values in Table.
- 3. The OCV of each test cell after testing is not less than 90% of its voltage immediately prior to this procedure.
- 4. Ambient temperature: 24°C

### **Conclusion:**

Li-ion Battery Pack had passed shock test.



		ST/S	G/AC.10/11 Rev	v.5/Amend.1 Se	ection 38.3			
Clause	Requireme	nt – Test	t		Result - Remark	Verdict		
38.3.4.5	Test 5: Exte	ernal Sh	ort Circuit			Р		
38.3.4.5.1	Purpose					Р		
	This test sin	nulates a	n external short c	ircuit.		Р		
38.3.4.5.2	Test proced	ure				Р		
		that its	be tested shall be external case tem			-		
	of less than	0.1ohm.	n with a total Exte			ے د		
		e cell or	dition is continued battery external c $2^{\circ}$ .		-			
38.3.4.5.3	Requiremer	nt						
	external ten	nperature disassem	neet this requirement does not exceed bly, no rupture an x hours after this t	170°C and d no fire during	Battery external temperature does not exceed 170°C, and there is no disassembly, no fire during the test and within six hours after this test.	Р		
Group		No.	External Highest Temperature (℃)	Criteria	<b>Y</b>	Result		
		01	55.8		temperature does not	Р		
Group A	a in fully	02	55.2		and there is no disassembly, no fire during the test and	Р		
(at first cycle charged sta		03	55.3	within six hours	after this test.	Р		
		04	55.4			Р		
		05	55.5			Р		
Group B	cles ending	06	55.2			Р		
in fully charg		07	56.1			Р		
		08	55.6			Р		
Ambient ten	nperature: 23	$\mathbb{C}^{-}$						

# Conclusion:

Li-ion Battery Pack had passed external short circuit test.



Test 6: Impact / Crush			ST/S	G/AC.10/11 Rev	v.5/Amend.1 Se	ection 38.3		
38.3.4.6.1 Purpose These tests simulate mechanical abuse from an impact or crush that may result in an internal short circuit.  38.3.4.6.2 Test procedure – Impact (applicable to cylindrical cells greater than 20 mm in diameter) The sample cell or component cell is to be placed on a flat smooth surface. A 15.8 mm ± 0.1 mm diameter, at least 6 cm long, or the longest dimension of the cell, whichever is greater. Type 316 stainless stee bar is to be placed across the centre of the sample. A 9.1 kg ± 0.1 kg mass is to be dropped from a height of 61 ± 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 sample is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8 mm ± 0.1 mm diameter curved surface lying across the centre of the test sample. Each sample is to be impacted with its longitudinal axis parallel is to be subjected to only a single impact.  Test Procedure — Crush (applicable to prismatic, pouch, coin/button cells and cylindrical cells not more than 20 mm in diameter)  A cell or component cell is to be crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 15 cm/s at the first point of contact. The crushing is to be continued until the first of the three options below is reached.  The applied force reaches 13 kN ± 0.78 kN;  Reach this condition P the cell is deformed by 50% or more of its original temperature does not exceed 170 °C and there is no disassembly and no fire during the test and within six hours after this test.  Component Cells external temperature does not exceed 170 °C and there is no disassembly and no fire during the test and during the test and within six hours after this test.	Clause	Requireme	nt – Tes	t		Result - Remark	Verdict	
These tests simulate mechanical abuse from an impact or crush that may result in an internal short circuit.  38.3.4.6.2 Test procedure – Impact (applicable to cylindrical cells greater than 20 mm in diameter)  The sample cell or component cell is to be placed on a flat smooth surface. A 15.8 mm ± 0.1 mm diameter, at least 6 cm 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 ± 0.1 kg mass is to be dropped from a height of 61 ± 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 sample is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8 mm ± 0.1 mm diameter curved surface lying across the centre of the test sample. Each sample is to be subjected to only a single impact.  The test ample is to be subjected to only a single impact.  38.3.4.6.3 Part of the sample is to be subjected to only a single impact.  A cell or component cells and cylindrical cells not more than 20 mm in diameter).  A cell or component cell is to be crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1.6 cm/s at the first point of contact. The crushing is to be continued until the first of the three options below is reached.  The applied force reaches 13 kN ± 0.78 kN;  The voltage of the cell drops by at least 100 mV;  The cell is deformed by 50% or more of its original thickness.  Cells and component cells meet this requirement if their external temperature does not exceed 170° C and there is no disassembly and no fire during the test and within six hours after this test.  Component Cells external temperature does not exceed 170° C and there is no disassembly and no f	38.3.4.6	Test 6: Imp	act / Cru	ısh		Component cell of	Р	
impact or crush that may result in an internal short circuit.  Test procedure – Impact (applicable to cylindrical cells greater than 20 mm in diameter)  The sample cell or component cell is to be placed on a flat smooth surface. A 15.8 mm ± 0.1 mm diameter, at least 6 cm 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 ± 0.1 kg mass is to be dropped from a height of 61 ± 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. The vertical track or channel used to guide the falling mass shall be oriented 90 degrees from the horizontal supporting surface.  The test sample is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8 mm ± 0.1 mm diameter curved surface lying across the centre of the test sample. Each sample is to be subjected to only a single impact.  Test Procedure – Crush (applicable to prismatic, pouch, coin/button cells and cylindrical cells not more than 20 mm in diameter)  A cell or component cell is to be crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1.5 cm/s at the first point of contact. The crushing is to be continued until the first of the three options below is reached.  The applied force reaches 13 kN ± 0.78 kN;  The voltage of the cell drops by at least 100 mV;  The cell is deformed by 50% or more of its original thickness.  Cells and component cells meet this requirement if their external temperature does not exceed 170 °C and there is no disassembly and no fire during the test and within six hours after this test.  Component Cells external temperature does not exceed 170 °C and there is no disassembly and no fire during the test and exceed 170 °C and there is no disassembly and no fire durin	38.3.4.6.1	Purpose					Р	
The sample cell or component cell is to be placed on a flat smooth surface. A 15.8 mm ± 0.1mm diameter, at least 6 cm 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 ± 0.1 kg mas is to be droped from a height of 61 ± 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 sample is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8 mm ± 0.1mm diameter curved surface lying across the centre of the test sample. Each sample is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8 mm ± 0.1mm diameter curved surface lying across the centre of the test sample. Each sample is to be subjected to only a single impact.  Test Procedure – Crush (applicable to prismatic, pouch, coin/button cells and cylindrical cells not more than 20 mm in diameter)  A cell or component cell is to be crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1.5 cm/s at the first point of contact. The crushing is to be continued until the first of the three options below is reached.  The applied force reaches 13 kN ± 0.78 kN;  The voltage of the cell drops by at least 100 mV;  The cell is deformed by 50% or more of its original thickness.  Requirement  Cells and component cells meet this requirement if their external temperature does not exceed 170 °C and there is no disassembly and no fire during the test and within six hours after this test.  Cells and component cells meet this requirement if their external temperature does not exceed 170 °C and there is no disassembly and no fire during the test and with		impact or cr circuit.	ush that	may result in an ir	nternal short		Р	
The sample cell or component cell is to be placed on a flat smooth surface. A 15.8 mm ± 0.1mm diameter, at least 6 cm 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 ± 0.1 kg mass is to be dropped from a height of 61 ± 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 sample is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8 mm ± 0.1mm diameter curved surface lying across the centre of the test sample. Each sample is to be subjected to only a single impact.  Test Procedure – Crush (applicable to prismatic, pouch, coin/button cells and cylindrical cells not more than 20 mm in diameter)  A cell or component cell is to be crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1.5 cm/s at the first point of contact. The crushing is to be continued until the first of the three options below is reached.  The applied force reaches 13 kN ± 0.78 kN;  The cell is deformed by 50% or more of its original thickness.  The cell is deformed by 50% or more of its original thickness.  Requirement  Cells and component cells meet this requirement if their external temperature does not exceed 170 °C and there is no disassembly and no fire during the test and within six hours after this test.  Component Cells external temperature does not exceed 170 °C and there is no disassembly and no fire during the test and within six hours after this test.  Component Cells external temperature does not exceed 170 °C and there is no disassembly and no fire does not exceed 170 °C and there is no disassembly and no fire does not exceed 170 °C and there is no disassembly a	38.3.4.6.2				o cylindrical cells		N	
axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8 mm ± 0.1 mm diameter curved surface lying across the centre of the test sample. Each sample is to be subjected to only a single impact.  Test Procedure – Crush (applicable to prismatic, pouch, coin/button cells and cylindrical cells not more than 20 mm in diameter)  A cell or component cell is to be crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1.5 cm/s at the first point of contact. The crushing is to be continued until the first of the three options below is reached.  The applied force reaches 13 kN ± 0.78 kN;  The voltage of the cell drops by at least 100 mV;  The cell is deformed by 50% or more of its original thickness.  Reach this condition  P  Cells and component cells meet this requirement if their external temperature does not exceed 170 °C and there is no disassembly and no fire during the test and within six hours after this test.  Cells and component cells meet this requirement if their external temperature does not exceed 170 °C and there is no disassembly and no fire during the test and within six hours after this test.  Criteria  Cromponent Cells external temperature does not exceed 170 °C and there is no disassembly and no fire during the test and within six hours after this test.  Criteria  Criteria  P  Resul  Criteria  P  After the test, The, component Cells external temperature does not exceed 170 °C and there is no disassembly and no fire during the test and within six hours after this test.		The sample flat smooth least 6 cm at the incontrolled massiding track falling mass guide the fafrom the ho	flat smooth surface. A 15.8 mm ± 0.1mm diameter, at least 6 cm 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 ± 0.1 kg mass is to be dropped from a height of 61 ± 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.					
Salva   Salv		axis paralle the longitud curved surfa sample. Ead single impa	I to the flatinal axis ace lying the samplet.	at surface and per of the 15.8 mm ± across the centre e is to be subjecte		N		
flat surfaces. The crushing is to be gradual with a speed of approximately 1.5 cm/s at the first point of contact. The crushing is to be continued until the first of the three options below is reached.  The applied force reaches 13 kN ± 0.78 kN;	38.3.4.6.3	pouch, coin	/button c	ells and cy <mark>li</mark> ndrica			Р	
The applied force reaches 13 kN ± 0.78 kN;		flat surfaces speed of ap contact. The	s. The cruproximate crushin	ushing is to be gra ely 1.5 cm/s at the g is to be continue	edual with a e first point of		Р	
The cell is deformed by 50% or more of its original thickness.  38.3.4.6.4 Requirement  Cells and component cells meet this requirement if their external temperature does not exceed 170 °C and there is no disassembly and no fire during the test and within six hours after this test.  Criteria  Group C  Group C  at first cycle at 50% of the design rated  The cell is deformed by 50% or more of its original chickness.  P  After the test, The, component Cells external temperature does not exceed 170 °C and there is no disassembly and no fire during the test and within six hours after this test.  Criteria  Criteria  Resul  P  The component Cells external temperature does not exceed 170 °C and there is no fire during the test and design rated does not exceed 170 °C and there is no fire during the test and design rated does not exceed 170 °C and there is no fire during the test and design rated does not exceed 170 °C and there is no fire during the test and design rated does not exceed 170 °C and there is no fire during the test and design rated does not exceed 170 °C and there is no fire during the test and design rated does not exceed 170 °C and there is no fire during the test and design rated does not exceed 170 °C and there is no fire during the test and design rated does not exceed 170 °C and there is no fire during the test and design rated does not exceed 170 °C and there is no fire during the test and design rated does not exceed 170 °C and there is no fired during the test and design rated does not exceed 170 °C and there is no fired during the test and design rated does not exceed 170 °C and there is no fired during the test and design rated does not exceed 170 °C and there is no fired during the test and design rated does not exceed 170 °C and there is no fired during the test and design rated design rated design rated does not exceed 170 °C and there is no fired during the test and design rated design rate design rate design rate					'8 kN;	⊠Reach this condition	Р	
The component cells meet this requirement if their external temperature does not exceed 170 °C and there is no disassembly and no fire during the test and within six hours after this test.    After the test, The, component Cells external temperature does not exceed 170 °C and there is no disassembly and no fire during the test and within six hours after this test.    After the test, The, component Cells external temperature does not exceed 170 °C and there is no disassembly and no fire during the test and within six hours after this test.    Component cells external temperature (°C)		The voltage	of the ce	ell drops by at leas	st 100 mV;	Reach this condition	Р	
38.3.4.6.4 Requirement         Cells and component cells meet this requirement if their external temperature does not exceed 170 °C and there is no disassembly and no fire during the test and within six hours after this test.       After the test, The, component temperature does not exceed 170 °C and there is no disassembly and no fire during the test and within six hours after this test.         Group C at first cycle at 50% of the design rated       09       86.8 (°C)         The component Cells external temperature does not exceed 170 °C and there is no disassembly and no fire during the test and disassembly an			deformed	by 50% or more	of its original	Reach this condition	Р	
Cells and component cells meet this requirement if their external temperature does not exceed 170 °C and there is no disassembly and no fire during the test and within six hours after this test.  Component cells external temperature does not exceed 170 °C and there is no disassembly and no fire during the test and within six hours after this test.  Component cells external temperature during the test and within six hours after this test.  Criteria  Criteria  P  Group C at first cycle at 50% of the design rated  10 102.2  The component Cells external temperature during the test and disassembly and no fire during the test and expositive during	38.3.4.6.4		nt				Р	
Group C at first cycle at 50% of the design rated     09     86.8 the design rated     The component Cells external temperature does not exceed 170 ℃ and there is no disassembly and no fire during the test and expansity.     P	5	Cells and component cells meet this requirement if their external temperature does not exceed 170 °C and there is no disassembly and no fire during the test and within six hours after this test.  After the test, The, component Cells external temperature does not exceed 170 °C and there is no disassembly and no fire during the test and within						
Group C at first cycle at 50% of the design rated 10 102.2 The component Cells external temperature does not exceed 170°C and there is no disassembly and no fire during the test and consolity.	Group		No.	cells external temperature	Criteria		Result	
the design rated 10 102.2 disassembly and no fire during the test and		. = 6 2 / -	09				Р	
connective within air bourse of an this took			10	102.2			Р	
			11	137.8			Р	



 TEST
 Report No.: STR12128435S

 12
 92.5
 P

 13
 98.1
 P

 Ambient temperature: 24.0℃

Conclusion:

Li-ion Battery Pack had passed Crush test.





	ST/S	G/AC.10/11 Rev	v.5/Amend.1 Se	ection 38.3	
Clause	Requirement – Test	t .		Result - Remark	Verdict
38.3.4.7	Test 7: Overcharge				Р
38.3.4.7.1	Purpose				Р
	This test evaluates the battery to withstand a				-
38.3.4.7.2	Test procedure				Р
	The charge current			2×1800mA=3600mA, Twice the manufacturer's recommended maximum continuous charge current.	P
	The minimum voltage	e of the test:			Р
	a) The minimum volta manufacturer's recor more than 18V).			2×8.4V=16.8V, the lesser of two times the maximum charge voltage of the battery or 22V,	Р
	b) The minimum volt manufacturer's recor than 18V).			\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	N
	Ambient temperature	<b>)</b> .		<b>24</b> °C	-
	The duration of the te	est.		24 hours	ı
38.3.4.7.3	Requirement				Р
	Rechargeable batter is no disassembly an within seven days aff	d no fire during th		There is no disassembly and no fire during the test and within seven days after the test.	Р
Group		No.	Criteria		Result
		01		ssembly and no fire during nin seven days after the test.	Р
Group A	e, in fully charged	02	the test and with	iiii seven uays ailei liie lest.	Р
states)	e, in fully charged	03			Р
		04			Р
		05			Р
Group B	ycles ending in fully	06			Р
charged sta		07			Р
		08			Р
Ambient ter	mperature: 24℃				

# Conclusion:

Li-ion Battery Pack had passed overcharge test.



Clause	Requirement – Test			Result - Remark	Verdict		
38.3.4.8	Test 8: Forced discha	arge			Р		
38.3.4.8.1	Purpose			Р			
	This test evaluates the rechargeable cell to wi condition.				Р		
38.3.4.8.2	Test procedure				Р		
	temperature by connect power supply at an init maximum discharge cumanufacturer.	Each cell shall be forced discharged at ambient emperature by connecting it in series with a 12 V DC, ower supply at an initial current equal to the naximum discharge current specified by the nanufacturer.  The specified discharge current is to be obtained by					
	The specified discharg connecting a resistive rating in series with the forced discharged for a to its rated capacity div (in ampere).	load of the approp e test cell, Each ce a time interval (in h	. 200	Р			
38.3.4.8.3	Requirement				Р		
	Primary or rechargeable cells meet this requirement if there is no disassembly and no fire during the test within seven days after the test.  There is no disassembly and no fire during the test within seven days after the test.						
Group		No.	Status	Criteria	•		
		14	OK				
		15	ОК				
		16	OK				
		17	OK				
Group E (at	first cycle in fully	18	OK				
discharged	states)	19	OK				
		20	OK				
		21	OK				
		22	OK				
		23	OK	There is no disassembly fire during the test within			
		24	OK	days after the test			
		25	OK				
	$\lambda \lambda^{\prime}$	26	OK				
		27	OK				
Group F (af	ter 50 cycles ending in	28	OK				
fully dischar	ged states)	29	OK				
		30	OK				
		31	OK				
		32	OK				
		33	OK				
Ambient ten	nperature: 24.0℃	-					

# **Conclusion:**

Li-ion Battery Pack had passed Forced discharge test.

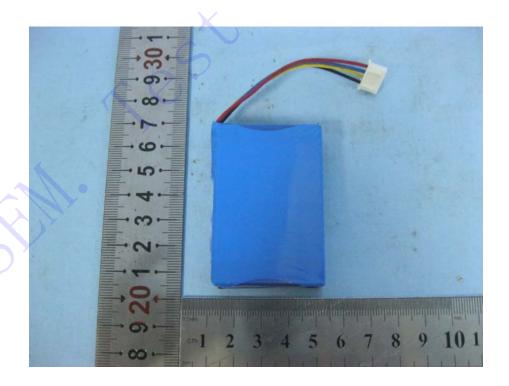


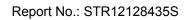
**Photos** 

Report No.: STR12128435S

Model: BL1800P0639602S1PPLB











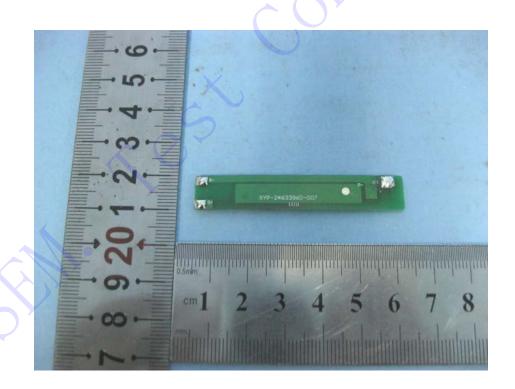




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\*\*\* End of Report \*\*\*

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