

TEST REPORT

ST/SG/AC.10/11 Rev.5/Amend.2 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. STR14129217S-2

Tested by (name+ signature) 张士杰 Jesse

Compiled by (+ signature):

Approved by (+ signature) 吴

Date of issue Jan. 07, 2015

Testing laboratory Shenzhen SEM.Test Technology 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 Jinling East Road, Suzhou Industrial Park, Suzhou,

Jiangsu, China

Standard ST/SG/AC.10/11Rev.5/Amend.2 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: Lithium-Ion Battery Pack

Trademark GlobTek

Model/type reference BL1880F6835661S5PG9T

Ratings 3.7V, 34.78Wh(9400mAh)



General product information:	
Max. charge voltage	4.2V
Max. charge current	9400mA
Standard charge current	1880mA
Max. discharge current:	14100mA
Standard discharge current	1880mA
Overcharge protection voltage	4.280±0.025V
Over discharge protection voltage	2.800±0.050V
Shape of cell	 ☐ Cylindrical cell (not less than 18.0 mm in diameter) ☐ Cylindrical cell (less than 18.0 mm in diameter) ☐ Prismatic cell ☐ Coin cell/Button cell ☑ Pouch cell
Classification:	☐ Lithium metal batteries☐ Lithium metal cells☐ Lithium ion batteries☐ Lithium ion cells
Samples Type:	 □ Large battery □ Large cell ☑ Small battery □ Small cell □ Single cell battery
Dimension:	L: 182.1mm W: 65.2mm T: 7.5mm
Mass of apparatus:	177.0g
Possible test case verdicts:	
- test case does not apply to the test object	: N(.A.)
- test object does meet the requirement	: P(ass)
- test object does not meet the requirement	F(ail)
Testing:	
Date of receipt of test item	: Dec. 17, 2014
Date(s) of performance of test	: Dec. 17, 2014 - Dec. 29, 2014
Test Conclusion:	
	by GlobTek, Inc. is tested according to Section 38.3 of Recommendations on the Transport of Dangerous Goods, Rev.5/Amend.2).



		ST/SG	/AC.10/11	Rev.5/Ame	nd.2 Se	ctic	on 38.3		
Clause	Requiremen	t – Test					Result -	Remark	Verdict
38.3.4	Procedure								Р
		st 1 to 5 must be conducted in sequence on the me cell or battery.							Р
	Test 6 and 8	Test 6 and 8 should be conducted using not otherwise tested cells or batteries.							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.						Р	
38.3.4.1	Test 1: Altitu	ude Simu	ılation						Р
38.3.4.1.1	Purpose								Р
	This test simulates air transport under low-pressure conditions.						-		
38.3.4.1.2	Test procedure								Р
	stored at a pi	ressure				11	I.6 kPa		-
	ambient temp	ient temperature (20 ± 5°ℂ)				24 °C			-
	Stored times	(≥ 6 hoι	≥ 6 hours)			8	hours		-
38.3.4.1.3	Requirement								Р
	leakage, no vono fire and if or battery after voltage immerequirement	and batteries meet this requirement if there is no age, no venting, no disassembly, no rupture and e and if the open circuit voltage of each test cell ttery after testing is not less than 90% of its ge immediately prior to this procedure. The rement relating to voltage is not applicable to test and batteries at fully discharged states.				dis ar tes 90 im	o leakage, n sassembly, and no fire. Basting is not lead of the voltage of the vo	attery after ess than age	P
				of Test Ba	ttery (g)			OCV (V)	
Group		No.	M1 (before the test)	M2 (after the test)	Mass Loss lin (0.1%	nit	OCV1 (before the test)	OCV2 (after the test)	OCV (≥90%)
		01	176.200	176.194	0.003%		4.195	4.194	99.976%
Group A (at	first cycle, in	02	177.005	176.999	0.003%	%	4.193	4.192	99.976%
fully charge		03	174.181	174.177	0.002%	%	4.196	4.194	99.952%
		04	176.605	176.594	0.006%	%	4.192	4.191	99.976%
		05	175.189	175.185	0.002%	%	4.195	4.194	99.976%
Group B (af	ter fifty	06	174.150	174.142	0.005%	%	4.194	4.192	99.952%
cycles endir charged sta		07	173.270	173.267	0.002%	%	4.193	4.192	99.976%
- I		08	175.021	175.008	0.007%	%	4.194	4.193	99.976%

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:

Lithium-Ion Battery Pack had passed altitude simulation test.



		ST/SG	S/AC.10/11	Rev.5/Ame	end.2 Se	ctic		140 011(14	
Clause	Requirement – Test						Result -	Remark	Verdict
38.3.4.2	Test 2: Ther	2: Thermal Test						Р	
38.3.4.2.1	Purpose								-
	This test assinternal elect using rapid a	rical conr	nections. The	e test is cond	lucted				-
38.3.4.2.2	Test procedu	re							Р
	Test temperature and stored hours					,	72±2℃, ≥6 -40±2℃, ≥		-
	The maximur	n time int	terval				tween test t remes is 30	temperature) minutes.	-
	Test times					rep	eated 10 ti	mes	-
	After which a for 24 hours	at ambier	nt temperatu	re (20±5°C)		24	C	-	
			batteries the duration of exposure ture extremes should be at least 12			Small battery			N
38.3.4.2.3	Requirement								Р
	leakage, no v no fire and if or battery afte voltage imme requirement	nd batteries meet this requirement if there is no e, no venting, no disassembly, no rupture and and if the open circuit voltage of each test cell ery after testing is not less than 90% of its immediately prior to this procedure. The ment relating to voltage is not applicable to test and batteries at fully discharged states. 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.						P	
			Mass N	of Test Ba	ttery (g)			OCV (V)	
Group		No.	M1 (before the test)	M2 (after the test)	Mass Loss lim (0.1%)	nit	OCV1 (before the test)	OCV2 (after the test)	OCV (≥90%)
		01	176.194	176.041	0.087%	6	4.194	4.111	98.021%
Group A (at	first cycle, in	02	176.999	176.872	0.072%	6	4.192	4.102	97.853%
fully charged	d states)	03	174.177	174.076	0.058%	6	4.194	4.116	98.140%
		04	176.594	176.439	0.088%	6	4.191	4.114	98.163%
		05	175.185	175.048	0.078%	6	4.194	4.075	97.163%
Group B (aft cycles ending		06	174.142	173.978	0.094%	6	4.192	4.119	98.259%
charged stat	,	07	173.267	173.110	0.091%	6	4.192	4.083	97.400%
		08	175.008	174.850	0.090%	6	4.193	4.109	97.997%

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:

Lithium-Ion Battery Pack had passed thermal test.



		ST/SG	S/AC.10/11	Rev.5/Ame	end.2 Se	ctic	•	140 011(14	
Clause	Requirement – Test						Result -	Remark	Verdict
38.3.4.3	Test 3: Vibration							Р	
38.3.4.3.1	Purpose	test simulates vibration during transport.					Р		
	This test simu	ulates vib	ration durino	g transport.					-
38.3.4.3.2	Test procedu	re							Р
	Cells and bat of the vibration such a manne	on machir er as to f	ne without di aithfully trans	storting the o	cells in ation.				-
	The vibration logarithmic.	snall be	a sinusoidai	waveform w	ith a				Р
	Duration					15	Smin		-
	Frequency ra	nge				7H	lz200Hz.	7Hz	-
	Amplitude					0.8	8mm		-
	hours for eac	nall be repeated 12 times for a total of 3 ch of three mutually perpendicular sitions of the cell.							-
	Requirement								Р
	leakage, no v no fire and if or battery afte voltage imme requirement i	ells and batteries meet this requirement if there is no akage, no venting, no disassembly, no rupture and fire and if the open circuit voltage of each test cell battery after testing is not less than 90% of its ltage immediately prior to this procedure. The quirement relating to voltage is not applicable to test lls and batteries at fully discharged states.						Р	
			Mass N	of Test Ba	ttery (g)			OCV (V)	
Group		No.	M1 (before the test)	M2 (after the test)	Mass Loss lim (0.1%)	nit	OCV1 (before the test)	OCV2 (after the test)	OCV (≥90%)
		01	176.041	176.040	0.001%	6	4.111	4.111	100.0%
Group A (at f	irst cycle, in	02	176.872	176.872	0.000%	6	4.102	4.102	100.0%
fully charged	states)	03	174.076	174.076	0.000%	6	4.116	4.116	100.0%
		04	176.439	176.435	0.002%	6	4.114	4.114	100.0%
		05	175.048	175.048	0.000%	6	4.075	4.075	100.0%
Group B (after cycles ending		06	173.978	173.978	0.000%	6	4.119	4.116	99.927%
charged state		07	173.110	173.110	0.000%	6	4.083	4.081	99.951%
		80	174.850	174.850	0.000%	6	4.109	4.109	100.0%

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:

Lithium-Ion Battery Pack had passed vibration test.



IESI	ST/SC	S/AC.10/11	Rev.5/Ame	end.2 Se	'	INU 31K14	
Clause Requireme	nt – Test				Result -	Remark	Verdict
38.3.4.4 Test 4: She	Test 4: Shock						Р
38.3.4.4.1 Purpose							Р
This test sin	nulates po	ssible impac	ts during tra	nsport.			-
38.3.4.4.2 Test proced	dure						Р
machine by	means of	es shall be se a rigid mour of each test	nt which will		This is small I	-	
a half-sine	•				150 g _n		-
Pulse durat	Pulse duration				6ms		-
the positive					three times sl	nocks	-
in the positi negative di	ve directio ection of t	nall be subje n followed by hree mutuall the cell or ba	y three shoc y perpendicu	ks in the ılar			-
38.3.4.4.3 Requireme	nt						Р
leakage, no no fire and or battery a voltage imm requiremen	s and batteries meet this requirement if there is no tage, no venting, no disassembly, no rupture and ire and if the open circuit voltage of each test cell attery after testing is not less than 90% of its					eakage, no sassembly, d no fire.	Р
<u> </u>			of Test Ba	ttery (g)		OCV (V)	•
Group	No.	M1 (before the test)	M2 (after the test)	Mass Loss lim (0.1%)	`	OCV2 (after the test)	OCV (≥90%)
	01	176.040	176.040	0.000%	4.111	4.111	100.0%
Group A (at first cycle, in	02	176.872	176.872	0.000%	4.102	4.102	100.0%
fully charged states)	03	174.076	174.076	0.000%	4.116	4.116	100.0%
	04	176.435	176.435	0.000%	4.114	4.114	100.0%
	05	175.048	175.048	0.000%	4.075	4.075	100.0%
Group B (after fifty	06	173.978	173.975	0.002%	4.116	4.116	100.0%
cycles ending in fully charged states)	07	173.110	173.110	0.000%	4.081	4.081	100.0%
-	08	174.850	174.850	0.000%	4.109	4.109	100.0%

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:

Lithium-Ion Battery Pack had passed shock test.



		ST/SG	6/AC.10/11 Rev.5/Ame	end.2 Se			
Clause	Requiremen	t – Test		Result - Remark	Verdict		
38.3.4.5	Test 5: Exte	rnal Sho	rt Circuit			Р	
38.3.4.5.1	Purpose					Р	
	This test sim	ulates an	ry to be tested shall be temperature t its external case temperature dition with a total External resistance shm. c condition is continued for at least one all or battery external case temperature 55±2℃. Battery external temperature does not exceed 170℃ and issembly, no rupture and no fire during in six hours after this test. Ro. External Highest Temperature (℃) 1 55.1 2 55.5 3 55.9 4 55.7 5 55.2 6 55.5 6 55.2 6 55.5 6 6 55.5				
38.3.4.5.2	Test procedu	ire			Р		
		that its ex		-			
	Short circuit condition with a total External resistance of less than 0.1ohm.					-	
		cuit condition is continued for at least one cell or battery external case temperature					
38.3.4.5.3	Requirement						
	external temperature there is no di	oerature o sassemb	does not exceed 170 $^\circ\mathbb{C}$ ally, no rupture and no fire	ind	temperature does not exceed 170°C, and there is no disassembly, no fire during the test and within	Р	
Group		No.	Temperature		Criteria	Result	
		01	` '			Р	
Group A	a im feether	02	55.5		- ,	Р	
(at first cycl charged sta		03	55.9	during t	he test and within six hours	Р	
		04	55.7	after thi	s test.	Р	
		05	55.2			Р	
Group B	ycles ending	06	55.5	1		Р	
in fully char		07	55.4			Р	
		08	55.3			Р	
Ambient ter	nperature: 23°(

Conclusion:

Lithium-Ion Battery Pack had passed external short circuit test.



	ST	ST/SG	6/AC.10/11 Rev.5/Am	end.2 Se	Report No.: 51R1412	
Clause	Requiremen				Result - Remark	Verdict
38.3.4.6	Test 6: Impa	ct / Crus	h		The test sample Component cell of rechargeable batteries.	Р
38.3.4.6.1	Purpose					Р
	impact or cru circuit.	sh that m	mechanical abuse from a nay result in an internal s	hort		Р
38.3.4.6.2	Test procedu not less than		act (applicable to cylindri in diameter)	cal cells		N
	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					N
	The test sam axis parallel the longitudir curved surface	ple is to be the flat axis of the lying a sample	be impacted with its long	lar to liameter est		N
38.3.4.6.3	pouch, coin/b	utton cel				Р
	Test Procedure – Crush (applicable to prismatic, pouch, coin/button cells and cylindrical cells less than 18.0 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.					Р
			ches 13 kN ± 0.78 kN;		⊠Reach this condition	Р
	The voltage of	of the cell	drops by at least 100 m	V;	Reach this condition	Р
	The cell is de thickness.	formed b	y 50% or more of its orig	jinal	Reach this condition	Р
38.3.4.6.4	Requirement				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	
	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				Р	
Group		No.	Component cells external temperature (℃)		Criteria	Result
		09	22.9		nponent Cells external	Р
Group C	ot 500/ of	10	22.8		ature does not exceed 170°C re is no disassembly and no	Р
at first cycle the design i	at 50% of rated capacity	11	23.1	fire duri	ng the test and within six	Р
-	-	12	23.1	nours at	fter this test.	Р



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13 22.7 P

Ambient temperature: 24.0℃

Conclusion:

Lithium-Ion Battery Pack had passed Crush test.



	ST/S0	G/AC.10/11 Rev.5/Am	end.2 Se	ection 38.3	
Clause	Requirement – Test			Result - Remark	Verdict
38.3.4.7	Test 7: Overcharge				Р
38.3.4.7.1	Purpose				Р
		trient stand an overcharge condition. 2×9400mA=18800mA, Twice the manufacturer's recommended maximum continuous charge current. voltage of the test: Important voltage of the test (The strecommended charge voltage is not (7). Important voltage of the test (The strecommended charge voltage is more streature. Interest voltage of the test (The streature). Interest voltage of the test (The streature). Interest voltage is more voltage is more streature. Interest voltage is more voltage. Interest voltage of the test (The streature). Interest voltage is more voltage. Interest voltage of the test (The streature). Interest voltage of the test (The streature). Interest voltage is not voltage is more voltage. Interest voltage of the test voltage is more voltage. Interest voltage of the test voltage is not voltage is more voltage is more voltage is more voltage. Interest voltage voltage is not voltage is not voltage is more voltage is more voltage. Interest voltage voltage is not voltage is not voltage is not voltage. Interest voltage voltage is not voltage is not voltage is not voltage. Interest voltage voltage is not voltage voltage is not voltage. Interest voltage voltage voltage.			-
38.3.4.7.2	Test procedure				Р
	The charge current			Twice the manufacturer's recommended maximum	Р
	The minimum voltage	of the test:			Р
	manufacturer's recommore than 18V).	imended charge voltage	is not	2×4.2V=8.4V	Р
			N		
	Ambient temperature.		24 ℃	-	
	The duration of the te	st.		24 hours	-
38.3.4.7.3	Requirement				Р
		d no fire during the test a		and no fire during the test and within seven days after	Р
Group		No.		Criteria	Result
		14			Р
Group D	a in fully about a	15			Р
(at first cycle states)	e, in fully charged	16	7		Р
,		17			Р
		18			
Group E	rales anding in falls	19			Р
charged sta	cles ending in fully tes)	20			Р
9	,	21			Р
Ambient ter	nperature: 24℃	•	1		

Conclusion:

Lithium-Ion Battery Pack had passed overcharge test.



Clause	1	G/AC.10/11Rev.5/Ame	nd.2 Sec	1	Verdict	
	Requirement – Test Result - Remark Test 8: Forced discharge					
38.3.4.8		arge			P	
38.3.4.8.1	Purpose This test evaluates the	ability of a primary or a			Р	
		is test evaluates the ability of a primary or a chargeable cell to withstand a forced discharge ndition. In st procedure In chell shall be forced discharged at ambient in perature by connecting it in series with a 12 V DC, were supply at an initial current equal to the aximum discharge current specified by the anufacturer. In e specified discharge current is to be obtained by innecting a resistive load of the appropriate size and ing in series with the test cell, Each cell shall be ceed discharged for a time interval (in hours) equal its rated capacity divided by the initial test current ampere). In any or rechargeable cells meet this requirement if amary or rechargeable cells meet this requirement if the instrument in seven days after the test. In any or rechargeable cells meet this requirement if the instrument in seven days after the test. In any or rechargeable cells meet this requirement if the instrument in seven days after the test. In any or rechargeable cells meet this requirement if the instrument in seven days after the test. In any or rechargeable cells meet this requirement if the instrument in seven days after the test. In any or rechargeable cells meet this requirement if the instrument in seven days after the test.				
38.3.4.8.2	Test procedure				Р	
	temperature by connect power supply at an init maximum discharge cumanufacturer.	cting it in series with a 1 ial current equal to the urrent specified by the	2 V DC,		Р	
	connecting a resistive rating in series with the forced discharged for a	ecting a resistive load of the appropriate size and g in series with the test cell, Each cell shall be discharged for a time interval (in hours) equal rated capacity divided by the initial test current mpere).				
38.3.4.8.3	Requirement				Р	
	there is no disassembl	oly and no fire during the test within seven days after the				
Group		No.		Criteria	Result	
		22				
		23			Р	
		24			Р	
		25			Р	
Group F (at	t first cycle in fully	26			Р	
discharged	states)	27			Р	
		28			Р	
		29			Р	
		30			Р	
		31			Р	
		32]		Р	
		33]		Р	
		34]		Р	
		35]		Р	
Group G (a	fter 50 cycles ending in	36]		Р	
	rged states)	37	1		Р	
·	38	1		Р		
		39	1		Р	
		40	1		Р	
		41	1		Р	

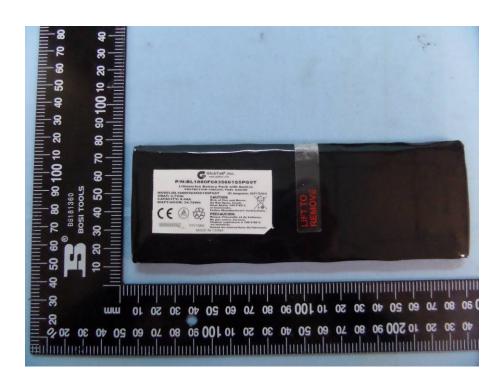
Conclusion:

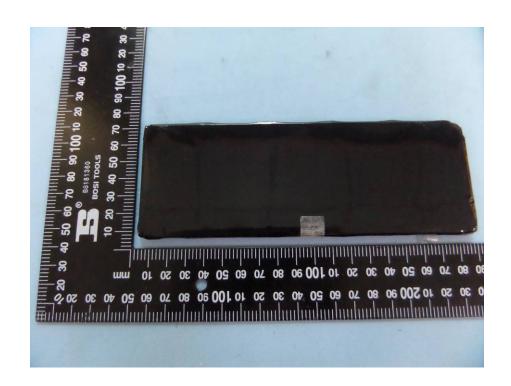
Lithium-Ion Battery Pack had passed Forced discharge test.



Photos

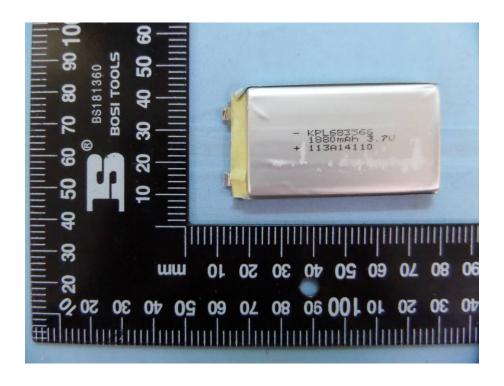
Model: BL1880F6835661S5PG9T

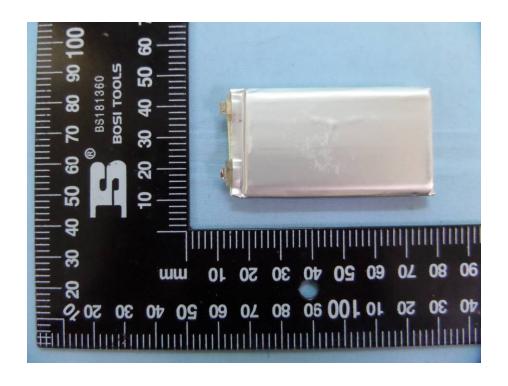






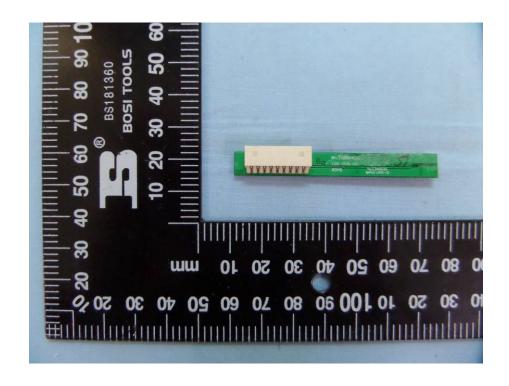


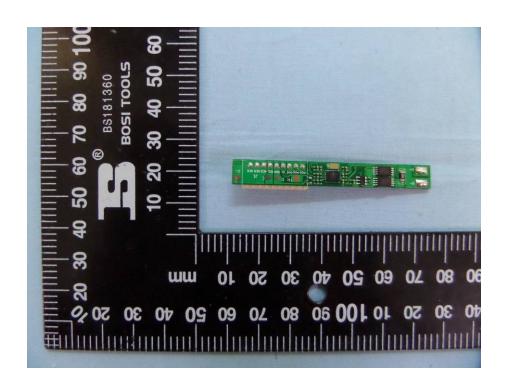












*** End of Report ***

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