Test Report issued under the responsibility of:

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TEST REPORT
UL 1642, Fourth Edition
Lithium Batteries

Report Reference No. ..... :	155491
Date of issue ..... :	2010-09-25
Total number of pages.....	15
Testing Laboratory ..... :	**Nemko Shanghai Ltd.**
Address ..... :	9A No. 528 Ruiqing Road, Pudong, Shanghai, China
Applicant's name ..... :	GlobTek, Inc.
Address ..... :	186 Veterans Dr. Northvale, NJ 07647 USA
Test specification:	
Standard..... :	UL 1642 (Fourth Edition)
Test procedure ..... :	Testing
Non-standard test method……..:	N/A
Test Report Form No. ..... :	UL 1642
Test Report Form(s) Originator..... :	Nemko(SH)
Master TRF ..... :	Dated 2010-09-20
Test item description.....:	Lithium Polymer Battery
Trade Mark..... :	GlobTek
Manufacturer ..... :	GlobTek, Inc.
Address ..... :	186 Veterans Dr. Northvale, NJ 07647 USA
Model/Type reference..... :	SR524148
Ratings..... :	3.7V/1000mAh

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Testing procedure and testing location:
☐ **Testing Laboratory**: Testing location/ address ..... : ☒ **Associated Test Laboratory:** Nemko Shanghai Ltd. Testing location/ address ..... : 9A No. 528 Ruiqing Road, Pudong, Shanghai, China Tested by (name + signature) .... : Approved by (+ signature)..... :
☐ Testing procedure: TMP Tested by (name + signature) .... : Approved by (+ signature)..... : Testing location/ address ..... :
☐ Testing procedure: WMT Tested by (name + signature) .... : Witnessed by (+ signature) ..... : Approved by (+ signature)..... : Testing location/ address ..... :
☐ Testing procedure: SMT Tested by (name + signature) .... : Approved by (+ signature)..... : Supervised by (+ signature) ..... : Testing location/ address ..... :
☐ Testing procedure: RMT Tested by (name + signature) .... : Approved by (+ signature)..... : Supervised by (+ signature) ..... : Testing location/ address ..... :

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Summary of testing:

The sample(s) tested complies with the requirements of
UL 1642 (Fourth Edition)

Tests performed (name of test and test clause):

10 Short-Circuit Test
11 Abnormal Charging Test
12 Forced-Discharge Test
13 Crush Test
14 Impact Test
15 Shock Test
16 Vibration Test
17 Heating Test
18 Temperature Cycling Test
19 Low Pressure (Altitude Simulation) Test

Marking label, user manual, packing text:

Instructions and marking shall be in a language acceptable for the country where the equipment is to be used.

Other product properties:

Depending on the country where the equipment is to be used, national deviations may be considered. Samples of the modified product may be tested again according to relevant clauses of the product standard, modified by national deviation

Note: The tested samples are found to comply with the clause 11,15,16,19 of the relevant product standards. (No Fire or Explosion, no Leakage Explosion, no Bulge). In this report only kept comply with the clause.

The end use application shall consider battery pack employs a protective a mechanical enclosure in accordance with the enclosure requirements of UL 2054.

Testing location:

CQC Intime (Suzhou) Testing Technology Co.,Ltd

WuZhong Science and Technology Park, No.1368, Wuzhong Dadao, Wuzhong Economic Development Zooe, Suzhou, Jiangsu, China

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Copy of marking plate:

N/A

Note: The end use application shall consider the need for the following markings and instructions or equivalent for the safe use of the battery pack:

Marking:

“Replace battery with (battery Recognized Company or end product manufacturer’s name, part number) only. Use of another battery may present a risk of fire or explosion.”

or “See Operating or maintenance Instructions for type of battery to be used” or equivalent with instructions for replacement of the correct battery pack provided.

or A symbol indicating the need to refer to the instruction manual may be used instead of the text noted above.

Instructions:

a. A warning notice with the following or equivalent:

“Caution – The battery used in this device may present a risk of fire or chemical burn if mistreated. Do no disassemble, heat above (manufacturer’s maximum temperature limit), or incinerate. Replace battery with (battery manufacturer’s name or end product manufacturer’s name and part number) only. Use of another battery may present a risk of fire or explosion.”

b. Complete instructions as to how to replace the battery including the following or equivalent statement:

“Dispose of used battery promptly. Keep away from children. Do not disassemble and do not dispose of in fire.”

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Test item particulars..... :	
Maximum Charging Voltage..... :	4.2V
Assembly mode ..... :	Cell
Operating Temperature..... :	Discharge:-10°C~ +50°C, Charge: 0 °C~ +45°C
..... :	
Possible test case verdicts:	
- test case does not apply to the test object.....:	N/A
- test object does meet the requirement .....:	P (Pass)
- test object does not meet the requirement .....:	F (Fail)
Testing .....:	
Date of receipt of test item.....:	
Date (s) of performance of tests.....:	

General remarks:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

Throughout this report a point is used as the decimal separator.

General product information:

These battery packs have been evaluated based upon manufacturer's specifications for charging, discharging and temperature limits. They have not been evaluated in combination with charger(s) or host product(s). Additional evaluation to determine that the compatibility of the host with the battery pack and the charger with the battery pack is not used outside of its rated limits.

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UL1642			
Clause	Requirement + Test	Result - Remark	Verdict

TESTS FOR TECHNICIAN-REPLACEABLE AND USER-REPLACEABLE BATTERIES			
ELECTRICAL TESTS			
11	**Abnormal Charging Test**		**P**
11.1	Primary cells or batteries shall comply with 11.2 – 11.7.		—
11.2	Cells or batteries conditioned in accordance with Table 6.3, as applicable, are to be used for this test. The batteries are to be tested in an ambient temperature of 20 ±5°C (68 ±9°F).		N/A
11.3	Each test sample battery is to be subjected to a charging current of three times the current Ic, specified by the manufacturer by connecting it in opposition to a dc-power supply. The specified charging current is to be obtained by connecting a resistor of the specified size and rating in series with the battery.		N/A
	The test charging time is to be calculated using the formula: $t_c = \frac{2.5\,C}{3(I_c)}$		N/A
11.4	When a non-resettable overcurrent or protective device operates during the test, the test is to be repeated at a charge current below the level that the protective device operates.		N/A
	When a resettable protective device operates during the test, the protector is allowed to reset to a total of 10 cycles; or until the appropriate charging time has been completed, but not less than 7 hours.		N/A
	Protective devices that are relied upon to meet the compliance criteria for the abnormal charging test shall comply with 2.3.1.		N/A
11.5	The samples shall not explode or catch fire.		N/A
11.6	Secondary cells or batteries shall comply with 11.7 – 11.10.		—

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11.7	Cells or batteries conditioned in accordance with Table 6.4, as applicable, are to be used for this test.		P
	The batteries are to be tested in an ambient temperature of 20 ±5°C (68 ±9°F).		P
11.8	Each test sample battery is to be discharged at a constant current of 0.2 C/1 hour, to a manufacturer specified discharge endpoint voltage.	See table 11.3	P
	The cell or battery is then to be charged with a constant maximum specified output voltage and a current limit of three times the maximum charging current, Ic, specified by the manufacturer.	See table 11.3	P
	Charging duration is to be 7 hours or the time required to reach the manufacturer's specified end-of-charge condition, whichever is greater.	See table 11.3	P
11.9	When a non-resettable overcurrent or protective device operates during the test, the test shall be repeated at an overcharging current below the level that the protection device operates.		N/A
	When a resettable protective device operates during the test, the protector is to be allowed to reset to a total of 10 cycles; or until the appropriate charging time has been completed, but not less than 7 hours.		P
	Protective devices that are relied upon to meet the compliance criteria for the abnormal charging test shall comply with 2.3.1.	See table 11.3	P
11.10	The samples shall not explode or catch fire.	See table 11.3	P
15	**Shock Test**		**P**
15.1	The cell is to be secured to the testing machine by means of a rigid mount which supports all mounting surfaces of the cell. Each cell shall be subjected to a total of three shocks of equal magnitude.	See table 15.2	P

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Clause	Requirement + Test	Result - Remark	Verdict
	The shocks are to be applied in each of three mutually perpendicular directions unless it has only two axes of symmetry in which case only two directions shall be tested.		P
	Each shock is to be applied in a direction normal to the face of the cell. For each shock the cell is to be accelerated in such a manner that during the initial 3 milliseconds the minimum average acceleration is 75 g (where g is the local acceleration due to gravity).		P
	The peak acceleration shall be between 125 and 175 g. Cells shall be tested at a temperature of 20 ± 5°C (68 ± 9°F).		P
15.2	The samples shall not explode or catch fire. In addition, the sample shall not vent or leak as described in 5.1.1.		P
16	**Vibration Test**		**P**
16.1	A battery is to be subjected to simple harmonic motion with amplitude of 0.8 mm (0.03 inch) [1.6 mm (0.06 inch) total maximum excursion].	See table 16.2	P
16.2	The frequency is to be varied at the rate of 1 hertz per minute between 10 and 55 hertz, and return in not less than 90 nor more than 100 minutes. The battery is to be tested in three mutually perpendicular directions.		P
	For a battery that has only two axes of symmetry, the battery is to be tested perpendicular to each axis.		P
16.3	The samples shall not explode or catch fire. In addition the sample shall not vent or leak as described in 5.1.1.		P
ENVIRONMENTAL TESTS			
19	**Low Pressure (Altitude Simulation) Test**		**P**
19.1	Sample batteries are to be stored for 6 hours at an absolute pressure of 11.6 kPa (1.68 psi) and a temperature of 20 ± 3°C (68 ± 5°F).	See table 19.1	P

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Clause	Requirement + Test	Result - Remark	Verdict
19.2	19.2 The samples shall not explode or catch fire as a result of the Low Pressure (Altitude Simulation) Test. In addition, the samples shall not vent or leak as described in 5.1.1.		P
FIRE EXPOSURE TEST			
MARKING			
21	**General**		**N/A**
21.1	A battery shall be legibly and permanently marked with:		N/A
	a) The manufacturer's name, trade name, or trademark or other descriptive marking by which the organization responsible for the product may be identified	The end use application shall consider the need for the markings and instructions or equivalent for the safe use of the battery pack:	N/A
	b) A distinctive ("catalog" or "model") number or the equivalent;		N/A
	c) The date or other dating period of manufacture not exceeding any three consecutive months.		N/A
	Exception No. 1: The manufacturer's identification may be in a traceable code if the product is identified by the brand or trademark owned by a private labeler.		N/A
	Exception No. 2: The date of manufacture may be abbreviated; or may be in a nationally accepted conventional code or in a code affirmed by the manufacturer, provided that the code:		N/A
	a) Does not repeat in less than 10 years, and		N/A
	b) Does not require reference to the production records of the manufacturer to determine when the product was manufactured.		N/A
21.6	If a manufacturer produces a battery at more than one factory, each battery package shall have a distinctive marking to identify it as the product of a particular factory		N/A
22	**Primary Batteries**		**N/A**

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Clause	Requirement + Test	Result - Remark	Verdict
22.1	A primary battery shall be marked with the word ″ WARNING ″ and the following or an equivalent statement: ″ Risk of fire and burns.		N/A
	Do not recharge, open, crush, heat above (the manufacturer's specified temperature rating), or incinerate. ″ If space does not permit marking on the battery, the marking may be on the smallest unit package.		N/A
	Exception No. 1: A cylindrical battery that is smaller in capacity than 300 milliampere hours and a coin, button, or pin battery is not required to be marked if the tests indicate these risks are not obtained.		N/A
	Exception No. 2: A user-replaceable battery may be marked with the word ″ CAUTION ″ in place of ″ WARNING. ″		N/A
	Exception No. 3: A cell intended for factory installation into a battery pack is not required to include the warning marking described in 22.1.		N/A
22.2	The packaging for a user-replaceable battery shall be marked with the word ″ CAUTION ″ and the following or equivalent statements:		N/A
	″ Risk of fire and burns. Do not recharge, disassemble, heat above (the manufacturer's specified temperature rating), or incinerate.		N/A
	Keep battery out of reach of children and in original package until ready to use. Dispose of used batteries promptly.		N/A
	Never put batteries in mouth.		N/A
	If swallowed, contact your physician or local poison control center		N/A
	Exception: The last two sentences are applicable only for a user-replaceable battery that is less than 32 mm (1.25 inch) diameter by 3.8 mm (0.15 inch) thick.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

	TABLE: 11.3 Abnormal Charging Test					P
☒ Charged, fully			☐ The number of recharge cycles			
capacity of the cell/battery in ampere-hours			4.2Vdc			
maximum charging current			1.5A			
☒ Test time 7 hours			☐ manufacturer's discretion__ hours			
No	1	2	3	4	5	
OCV1 at start of test, Vdc	3.01	3.01	3.04	3.07	3.03	
OCV2 at after of test, Vdc	4.20	4.20	4.20	4.20	4.20	
Maximum Case Temperature Rise , °C	23.7	23.5	24.1	23.5	24.2	
Results	P	P	P	P	P	
supplementary information: ☒ No Fire or Explosion ☒ No Leakage ☐ Leakage ☐ Fire ☐ Explosion ☐ Bulge Other (Please Explain)						
☐ Charged, fully			☒ The number of recharge cycles			
capacity of the cell/battery in ampere-hours			4.2Vdc			
maximum charging current			1.5A			
☒ Test time 7 hours			☐ manufacturer's discretion__ hours			
No	1	2	3	4	5	
OCV1 at start of test, Vdc	3.03	3.02	3.06	3.07	3.02	
OCV2 at after of test, Vdc	4.20	4.20	4.20	4.21	4.19	
Maximum Case Temperature Rise, °C	23.5	23.9	23.5	23.7	24.1	
Results	P	P	P	P	P	
supplementary information: ☒ No Fire or Explosion ☒ No Leakage ☐ Leakage ☐ Fire ☐ Explosion ☐ Bulge Other (Please Explain)						

	TABLE: 15.2 Shock Test	P

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Clause	Requirement + Test	Result - Remark	Verdict

☒ Charged, fully			☐ The number of recharge cycles		
No	1	2	3	4	5
OCV1 at start of test, Vdc	4.15	4.14	4.15	4.14	4.15
weight (M0) at start of test, g	19.6732	19.8286	19.5359	19.4517	19.6110
weight (M1) at after of test, g	19.6725	19.8269	19.5354	19.4516	19.6106
Lost weight ,% (M0-M1)/M0	0.036	0.0086	0.0026	0.0005	0.0020
Maximum Case Temperature Rise, °C	23.2	23.3	23.3	23.2	23.2
Results	P	P	P	P	P
supplementary information: ☒ No Fire or Explosion ☒ No Leakage ☐ Leakage ☐ Fire ☐ Explosion ☐ Bulge Other (Please Explain)					
☐ Charged, fully			☒ The number of recharge cycles		
No	1	2	3	4	5
OCV1 at start of test, Vdc	4.17	4.17	4.17	4.17	4.17
weight (M0) at start of test, g	19.3897	19.4414	19.5536	19.8305	19.5642
weight (M1) at after of test, g	19.3777	19.4330	19.5500	19.8242	19.5580
Lost weight ,% (M0-M1)/M0	0.0619	0.0432	0.0184	0.0318	0.0320
Maximum Case Temperature Rise, °C	23.2	23.3	23.3	23.3	23.3
Results	P	P	P	P	P
supplementary information: ☒ No Fire or Explosion ☒ No Leakage ☐ Leakage ☐ Fire ☐ Explosion ☐ Bulge Other (Please Explain)					

	TABLE: 16.2 Vibration Test	P
☒ Charged, fully	☐ The number of recharge cycles	

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Clause	Requirement + Test	Result - Remark	Verdict

No	1	2	3	4	5
OCV1 at start of test, Vdc	4.14	4.15	4.14	4.14	4.14
weight (M0) at start of test, g	19.6494	19.5773	19.6626	19.7708	19.6647
weight (M1) at after of test, g	19.6477	19.5762	19.6601	19.7690	19.5918
Lost weight ,% (M0-M1)/M0	0.0087	0.0056	0.013	0.0091	0.0371
Maximum Case Temperature Rise, °C	23.3	23.3	23.3	23.4	23.5
Results	P	P	P	P	P
supplementary information: ☒ No Fire or Explosion ☒ No Leakage ☐ Leakage ☐ Fire ☐ Explosion ☐ Bulge Other (Please Explain)					
☐ Charged, fully			☒ The number of recharge cycles		
No	1	2	3	4	5
OCV1 at start of test, Vdc	4.17	4.17	4.17	4.17	4.17
weight (M0) at start of test, g	19.6798	19.6119	19.5780	19.7329	19.7310
weight (M1) at after of test, g	19.6779	19.6101	19.5765	19.7313	19.7191
Lost weight ,% (M0-M1)/M0	0.0097	0.0092	0.0077	0.0081	0.0096
Maximum Case Temperature Rise, °C	23.3	23.3	23.2	23.3	23.3
Results	P	P	P	P	P
supplementary information: ☒ No Fire or Explosion ☒ No Leakage ☐ Leakage ☐ Fire ☐ Explosion ☐ Bulge Other (Please Explain)					

	TABLE: 19.1 Low Pressure (Altitude Simulation) Test				P
☒ Charged, fully			☐ The number of recharge cycles		
No	1	2	3	4	5

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Clause	Requirement + Test	Result - Remark	Verdict

OCV1 at start of test, Vdc	4.14	4.15	4.14	4.15	4.14
weight (M0) at start of test, g	19.374	19.358	19.531	19.672	19.667
weight (M1) at after of test, g	19.371	19.352	19.527	19.668	19.665
Lost weight ,% (M0-M1)/M0	0.015	0.031	0.020	0.02	0.01
Maximum Case Temperature Rise, °C	21.7	22.3	21.9	21.5	21.4
Results	P	P	P	P	P
supplementary information: ☒ No Fire or Explosion ☒ No Leakage ☐ Leakage ☐ Fire ☐ Explosion ☐ Bulge Other (Please Explain)					
☐ Charged, fully			☒ The number of recharge cycles		
No	1	2	3	4	5
OCV1 at start of test, Vdc	4.18	4.18	4.18	4.17	4.18
weight (M0) at start of test, g	19.677	19.483	19.602	19.482	19.548
weight (M1) at after of test, g	19.672	19.479	19.657	19.478	19.541
Lost weight ,% (M0-M1)/M0	0.025	0.021	0.026	0.021	0.036
Maximum Case Temperature Rise ΔT, °C	21.4	21.2	21.9	21.4	22.1
Results	P	P	P	P	P
supplementary information: ☒ No Fire or Explosion ☒ No Leakage ☐ Leakage ☐ Fire ☐ Explosion ☐ Bulge Other (Please Explain)					

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Clause	Requirement + Test	Result - Remark	Verdict

	ANNEX : Pictures	**-**