

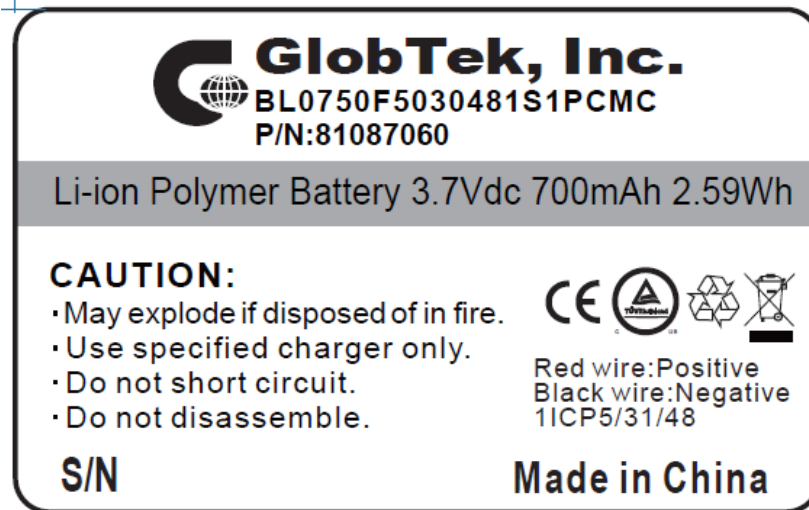


**Produkte**
*Products*

<b>Prüfbericht - Nr.:</b> 50048525 001		<b>Seite 1 von 30</b> <i>Page 1 of 30</i>			
<i>Test Report No.:</i>					
<b>Auftraggeber:</b> <i>Client:</i>	GlobTek, Inc. 186 Veterans Dr. Northvale NJ 07647, USA				
<b>Gegenstand der Prüfung:</b> <i>Test item:</i>	Li-ion Polymer Battery				
<b>Bezeichnung:</b> <i>Identification:</i>	BL0750F5030481S1PC*C (*=A, B, C, H, J, K, L, M, N, P, Q, R, T, U, V, 1, 2, 3, 4, 5, 6, 7, 8, 9)	<b>Serien-Nr.:</b> <i>Serial No.:</i>	N/A		
<b>Wareneingangs-Nr.:</b> <i>Receipt No.:</i>	164066865	<b>Eingangsdatum:</b> <i>Date of receipt:</i>	2016-08-28		
<b>Prüfört:</b> <i>Testing location:</i>	TÜV Rheinland (Shenzhen) Co., Ltd. 3&4 F, Cybio Technology Building No. 1, Langshan No. 2 Road South, 5th Industrial Area, High-Tech Industry Park North, Nanshan District, 518057 Shenzhen, P.R. China				
<b>Prüfgrundlage:</b> <i>Test specification:</i>	UL 2054:2004 R9.11 UL 60950-1:2007 R10.14  CAN/CSA-C22.2 No.60950-1-07+A1:2011+A2:2014				
<b>Prüfergebnis:</b> <i>Test Result:</i>	Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n). <i>The test item passed the test specification(s).</i>				
<b>Prüflaboratorium:</b> <i>Testing Laboratory:</i>	TÜV Rheinland (Shenzhen) Co., Ltd. 3&4 F, Cybio Technology Building No. 1, Langshan No. 2 Road South, 5th Industrial Area, High-Tech Industry Park North, Nanshan District, 518057 Shenzhen, P.R. China				
<b>geprüft/ tested by:</b>	<b>kontrolliert/ reviewed by:</b>				
					
2016-09-30 Crystal Ye / Project Engineer	2016-09-30 Charlie Zeng / Reviewer				
<b>Datum</b> <i>Date</i>	<b>Name/Stellung</b> <i>Name/Position</i>	<b>Unterschrift</b> <i>Signature</i>	<b>Datum</b> <i>Date</i>	<b>Name/Stellung</b> <i>Name/Position</i>	<b>Unterschrift</b> <i>Signature</i>
<b>Sonstiges/ Other Aspects:</b>					
This report is issued for cTUVus approval; The complete test report includes the following documents: - UL 2054 test report (30 pages); - Attachment 1: UL 60950 test report (49 pages); - Attachment 2: Photo documents (4 pages).					
<b>Abkürzungen:</b>	<b>P(ass)</b> = entspricht Prüfgrundlage <b>F(ail)</b> = entspricht nicht Prüfgrundlage <b>N/A</b> = nicht anwendbar <b>N/T</b> = nicht getestet	<b>Abbreviations:</b>	<b>P(ass)</b> = passed <b>F(ail)</b> = failed <b>N/A</b> = not applicable <b>N/T</b> = not tested		
<b>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</b>					
<i>This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.</i>					

<b>Test item particulars:</b>	
Information about the product needed to establish a correct test program, such as product mobility, type of power connections and similar.	(Test item particulars are selected by the TRF Originator base on the requirements in the standard)
Designation .....	<b>BL0750F5030481S1PC*C (*=A, B, C, H, J, K, L, M, N, P, Q, R, T, U, V, 1, 2, 3, 4, 5, 6, 7, 8, 9)</b>
Trade mark.....	
Nominal voltage.....	3.7V
Rated capacity.....	700mAh
Maximum charge voltage.....	4.2V
Maximum charge current.....	700mA
Final voltage.....	3.0V
Max Ambient Temperature.....	45°C max (charge), 60°C max (discharge)
Manufacturer's charge method.....	Charging the battery with 140mA constant current and 4.2V constant voltage until the current less than 7mA
Sample number.....	A000407428-001 to 035
<b>Possible test case verdicts:</b>	
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)
<b>Testing:</b>	
Date of receipt of test item .....	July 11, 2016
Date(s) of performance of tests .....	July 11, 2016 –August 28, 2016
<b>General remarks:</b>	
This report shall not be reproduced, except in full, without the written approval of the testing laboratory.	
The test results presented in this report relate only to the object tested.	
"(see remark #)" refers to a remark 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.	

**Copy of marking plate**


The date code marked on marking label, see below:

1. MMYYGXXXXX

MM =month (01, 02.....12)

YY= Year (16, 17.....)

G=G (GlobTek)

XXXXX= serial number (00001.....999999)

2. YYYY MM

MM =month (01, 02.....12)

YYYY= Year (2016, 2017.....)

Remark: The product is a built-in battery, the French caution should be marked on the French user manual.

**Summary of testing:**

The component cell or GP503048 is approved by TUV-RH according to UL1642.

Charging method declared by the manufacturer in specification: Charging the battery with 140mA of constant current and 4.2V constant voltage until charging current reach 7mA.

**Test items:**

- cl.9 Short-Circuit Test;
- cl.10 Abnormal Charging Test;
- cl.11 Abusive Overcharge Test;
- cl.12 Forced-Discharge Test
- cl.13A Battery Pack Component Temperature Test;
- cl.13B Battery Pack Surface Temperature Test;
- cl.19 250N Steady Force Test;
- cl.20 Mold Stress Relief Test;
- cl.21 Drop Impact Test.

**Description of the product:**

This Li-ion Polymer Battery is constructed with one Li-ion cell without enclosure.

1) The battery has not been evaluated in combination with charger(s) or host product(s). Additional evaluation to determine compliance may be required on the combination(s) in the end product evaluation.

2) The battery was evaluated for a maximum charge current and maximum voltage limit outlined in the Table below. The end product evaluation shall ensure that current and voltage limits noted are maintained.

Model different:

The models are identical except the connectors type, see below:

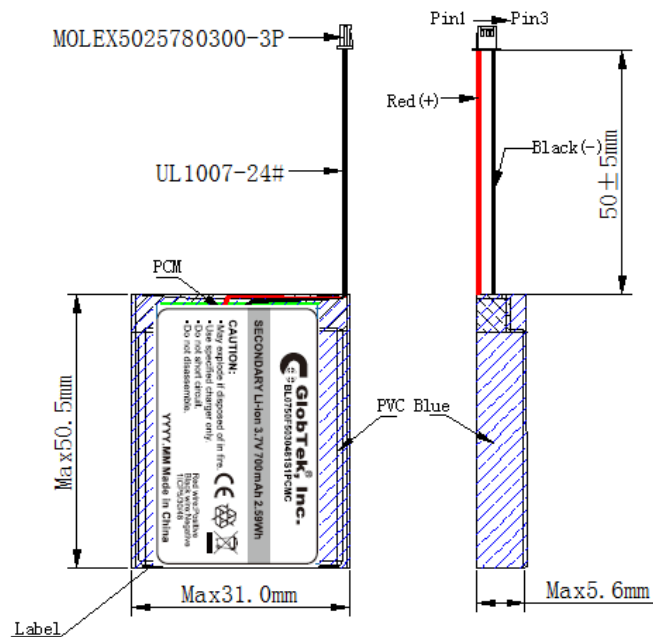
Definition of variable for model BL0750F5030481S1PC\*C, the "\*" means the connector type, see below.

Variable:	Range of variable:	Content:
*	A, B, C, H, J, K, L, M, N, P, Q, R, T, U, V, 1, 2, 3, 4, 5, 6, 7, 8, 9	A = Strip + tin, B = Button, C = Contacts, H = Hirose (any style), J = 2p JST, K = 3p JST, L = 4p JST, M = 2p Molex, N = 3p Molex, P = 4p Molex, Q = 6 contacts Molex, R = Multiple connectors, T = 2p Tyco, U = 3p Tyco, V = 4p Tyco, 1 = 1p connector, 2 = 2p connector, 3 = 3p connector, 4 = 4p connector, 5 = 5p connector, 6 = 6p connector, 7 = 7p connector, 8 = 8p connector, 9 = 9p connector.

#### Battery pack electrical character profile:

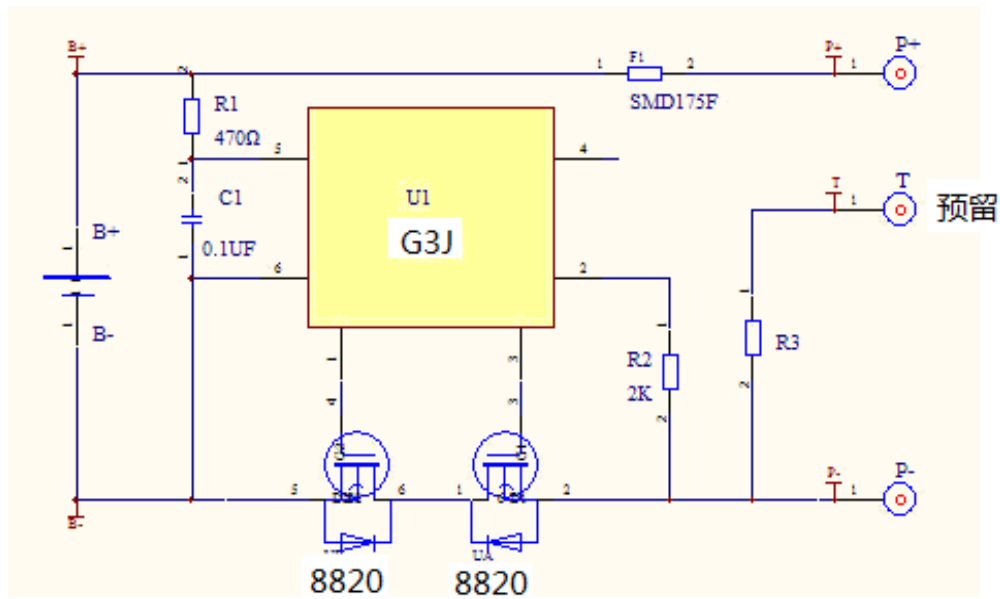
Model	Nominal capacity	Nominal voltage	Nominal Charge Current	Nominal Discharge Current	Max. Charge Current	Max. Discharge Current	Max. Charge Voltage	Cut-off Voltage
BL0750F503048 1S1PC*C	700mAh	3.7Vdc	140mA	140mA	700mA	1050mA	4.2V	3.0V

#### Construction:



Battery

**Circuit diagram:**



**Factory location :**

UL 2054:2004 R9.11			
Clause	Requirement + Test	Result - Remark	Verdict

<b>INTRODUCTION</b>			
<b>1</b>	<b>Scope</b>		P
<b>1.1</b>	These requirements cover portable primary (non-rechargeable) and secondary (rechargeable) batteries for use as power sources in products. These batteries consist of either a single electrochemical cell or two or more cells connected in series, parallel, or both, that convert chemical energy into electrical energy by chemical reaction.		P
<b>1.2</b>	These requirements are intended to reduce the risk of fire or explosion when batteries are used in a product. The proper use of these batteries in a particular application is dependent on their use in a complete product that complies with the requirements applicable to such a product.		P
<b>1.3</b>	These requirements are intended to cover batteries for general use and do not include the combination of the battery and the host product which are covered by requirements in the host product standard.		P
<b>1.4</b>	These requirements are also intended to reduce the risk of injury to persons due to fire or explosion when batteries are removed from a product to be transported, stored, or discarded.		P
<b>1.5</b>	These requirements do not cover the toxicity risk that results from the ingestion of a battery or its contents, nor the risk of injury to persons that occurs if a battery is cut open to provide access to its contents.		P
<b>2</b>	<b>General</b>		P
<b>2.1</b>	<b>Lithium cells</b>		P
<b>2.1.1</b>	In lieu of the requirements outlined in Table 6.1 cells constructed of lithium metal, lithium alloy or lithium ion, that are used in batteries, shall meet the requirements in the Standard for Lithium Batteries, UL 1642.		P
<b>2.1.2</b>	Deleted, effective November 11, 2011		N/A
<b>2.1.3</b>	Deleted, effective November 11, 2011		N/A
<b>2.2</b>	<b>Units of measurement</b>		P
<b>2.3</b>	<b>Terminology</b>		P
<b>2.4</b>	<b>Components</b>		P
<b>2.4.1</b>	Except as indicated in 2.4.2, a component of a product covered by this standard shall comply with the requirements for the component. See Appendix A for a list of standards covering components used in the products covered by this standard.		P
<b>2.4.2</b>	A component is not required to comply with a specific requirement that: <ul style="list-style-type: none"> <li>a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard, or</li> <li>b) Is superseded by a requirement in this standard.</li> </ul>		P
<b>2.4.3</b>	A component shall be used in accordance with its rating established for the intended conditions of use.		P
<b>2.4.4</b>	Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions.		P
<b>3</b>	<b>Glossary</b>		P

UL 2054:2004 R9.11			
Clause	Requirement + Test	Result - Remark	Verdict

<b>CONSTRUCTION</b>			
<b>4</b>	<b>General</b>		P
<b>4.1</b>	<b>Casing</b>		N/A
<b>4.1.1</b>	The casing of a cell or single cell battery, or the enclosure of a battery pack shall have the strength and rigidity required to resist the possible abuses, that it is exposed to during its intended use, in order to reduce the risk of fire or injury to persons.	Battery without enclosure.	N/A
<b>4.1.2</b>	The casing of a battery pack shall be rigid enough to prevent flexing. A tool providing the mechanical advantage of a pliers, screwdriver, hacksaw, or similar tool, shall be the minimum mechanical capability required to open the casing.		N/A
<b>4.1.3</b>	For battery packs with plastic outer enclosures, the outer enclosure of the battery shall be designed such that it is not capable of being opened using simple tools, such as a screwdriver. The enclosure shall be ultrasonically welded, or secured by equivalent means. Adhesives complying with the adhesive requirements of the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C, single use or tamper-proof screws are considered equivalent means.		N/A
<b>4.1.4</b>	The outer case material of the battery shall be classed as V-1 or less flammable in the minimum part thickness in accordance with the Standard for Polymeric Materials — Use in Electrical Equipment Evaluations, UL 746C.  Exception: Materials are not required to be classed as V-1 or less flammable when they comply with the Enclosure Flammability – 20 mm (3/4 inch) Flame test described in the Standard for Polymeric Materials– Use in Electrical Equipment Evaluations, UL 746C.		N/A
<b>4.1.5</b>	Openings in battery pack enclosures shall be minimized to prevent damage to cells, connections, and internal circuitry and shorting of electrical spacings within the pack. Enclosure openings shall not be located over cells that do not comply with the rigid casing requirements of 4.1.2 or over protective circuitry and connections where damage or shorting from debris entering the enclosure could result in a hazard.		N/A
<b>4.2</b>	<b>Electrolyte</b>		P
<b>4.2.1</b>	A cell shall not contain pressurized vapor or liquid that expels materials forcibly when the battery casing is punctured with a grinding wheel under laboratory conditions at a temperature of 23 ±2°C (73±3.6°F).	The component cell has approved by TUV-RH according to UL1642.	P
<b>4.3</b>	<b>External battery pack connectors</b>		P

<b>UL 2054:2004 R9.11</b>			
Clause	Requirement + Test	Result - Remark	Verdict
4.3.1	An external battery pack connector shall be constructed to prevent inadvertent short circuiting of its terminals unless the pack meets the limited power source requirements of the Limited Power Source Test, Section 13. Examples of methods to prevent inadvertent short-circuiting include recessing the terminals, providing circuitry that prevents inadvertent short circuiting, providing covers over the terminals, use of keyed connectors, and the like.	Complied.	P
4.3.2	Insulating material for external battery pack connectors, outside the enclosure, shall have a V-2 minimum flame rating unless the pack meets the limited power source requirements of the Limited Power Source Test, Section 13. External connectors forming part of the fire enclosure shall be V-1 minimum.	Complied.	P
<b>4.4</b>	<b>Printed wiring boards</b>		P
<b>4.4.1</b>	Printed wiring boards mounting battery circuit components shall be rated V-1 minimum	Rated V-0, See Critical Component Table.	P
<b>4.5</b>	<b>Lithium ion systems only</b>		P
<b>4.5.1</b>	The voltage of each cell or each cellblock consisting of parallel-connected plural cells should not exceed the upper limit of the charging voltage specified by the cell manufacturer.	Complied.	P
<b>4.5.2</b>	For the battery consisting of a single cell or a single cellblock, it should be confirmed that the charging voltage of the cell does not exceed the upper limit of the charging voltage specified by the cell manufacturer.	Complied	P
<b>4.5.3</b>	For the battery consisting of series-connected plural single cells or series-connected plural cellblocks, it should be confirmed that the voltages of any one of the single cells or single cellblocks does not exceed the upper limit of the charging voltage, specified by the cell manufacturer, by monitoring the voltage of every single cell or the single cellblocks.		N/A
<b>4.5.4</b>	Compliance for 4.5.1 – 4.5.3 can be achieved through analysis of the battery protection circuit or if unable to determine through analysis, than through monitoring values during the test of Section 13A.		P
<b>PERFORMANCE</b>			
<b>5</b>	<b>General</b>		P
<b>5.1</b>	Batteries are to be tested as described in Sections 9 through 24. Section 12, Forced-Discharge Test, is applicable only to cells intended to be used in multicell series applications, such as battery packs. The Battery Enclosure Tests, Sections 18 — 21 (including the 250 N Steady Force, Mold Stress Relief, and Drop Impact Tests) are intended only for batteries that have a plastic outer enclosure.	Tested as required.	P



<b>UL 2054:2004 R9.11</b>			
Clause	Requirement + Test	Result - Remark	Verdict
<b>5.2</b>	With the exception of the Projectile Test of Section 22, cells and/or batteries shall not explode or catch fire as a result of the tests in this standard. For the Shock Test, Section 16, Vibration Test, Section 17, 250 N Steady Force Test, Section 19, Mold Stress Relief Test, Section 20, Drop Impact Test, Section 21, and the Temperature Cycling Test, Section 24 the samples shall also not vent or leak. For these tests unacceptable leakage is deemed to have occurred when the resulting mass loss exceeds the values shown in Table 5.1, Venting and Leakage Mass Loss Criteria.	See tests below.	P
<b>5.3</b>	Deleted August 12, 2008		N/A
<b>5.4</b>	Certain end product devices require that the power output of a battery be limited. The Limited Power Source Test described in Section 13 is to be used to determine whether a cell or battery is suitable in such applications where fire hazards may otherwise exist.	Not evaluated in the report	N/A
<b>6</b>	<b>Samples</b>		P
6.1	Unless otherwise indicated, fresh cells or batteries in the fully charged state are to be used for the tests described in Sections 9 – 24. The test program and number of samples to be used in each test is shown in Tables 6.1 and 6.2, for cell testing and battery pack testing, respectively.	Tested as required.	P
6.2	When a battery pack is tested in accordance with Table 6.2, the cells comprising that battery pack shall also be tested in accordance with Table 6.1 if they have not already been.	The component cell has approved by TUV-RH according to UL1642.	N/A
6.3	All batteries shall be fully charged in accordance with the manufacturer's specifications prior to testing except for the samples to be subjected to the Abnormal Charging and Abusive Overcharge Tests, which shall be discharged to the manufacturer specified end point voltage using the manufacturer specified current prior to testing.	Suitable samples prepared according to each test clause requirement.	P
<b>7</b>	<b>Important test considerations</b>		P
<b>7.1</b>	As some batteries explode in the tests described in Sections 9 — 24, it is important that personnel be protected from the flying fragments, explosive force, sudden release of heat, chemical burns, and noise results from such explosions. The test area is to be well ventilated to protect personnel from possible harmful fumes or gases.	Test facilities checked and complied.	P

<b>UL 2054:2004 R9.11</b>			
Clause	Requirement + Test	Result - Remark	Verdict
<b>7.2</b>	The temperatures on the surface of the battery casings shall be monitored during the tests described in Sections 9, 10, 11, 14, and 15. All personnel involved in the testing of batteries are to be instructed never to approach a battery until the surface temperature returns to ambient temperature.	Temperature on battery case recorded for so requested clauses, also see appended tables.	P
<b>7.3</b>	The tests described in Section 22, Projectile Test, shall be conducted in a separate room or room equipped with an adequate safety barrier separating the test area from the observer.		N/A
<b>8</b>	<b>Temperature measurements</b>		P
<b>8.1</b>	Temperatures are to be measured by thermocouples consisting of wires not larger than 24 AWG (0.21 mm <sup>2</sup> ) and not smaller than 30 AWG (0.05 mm <sup>2</sup> ) and a potentiometer-type instrument.	Suitable thermocouples used during the test.	P
<b>8.2</b>	The temperature measurements on the batteries are to be made with the measuring junction of the thermocouple held tightly against the outer casing of the battery.	Fulfilled.	P
<b>ELECTRICAL TESTS</b>			
<b>9</b>	<b>Short-Circuit Test</b>		P
<b>9.1</b>	Cells shall comply with 9.1 — 9.6. <i>(UL approved battery cell used in the EUT according to UL1642)</i>		N/A
<b>9.2</b>	Each fully charged test sample cell, in turn, is to be short-circuited by connecting the positive and negative terminals of the battery with a circuit load having a resistance load of 80 ± 20 mohm. The temperature of the battery case is to be recorded during the test. The battery is to discharge until a fire or explosion is obtained, or until it has reached a discharged state of less than 0.2 volts and/or the case temperature has returned to ±10°C (±18°F) of ambient temperature.		N/A
<b>9.3</b>	Tests are to be conducted at 20 ± 5°C (68 ± 9°F), and at 55 ± 2°C (131 ± 4°F). The cells are to reach equilibrium at 20 ± 5°C (68 ± 9°F) or 55 ± 2°C (131 ± 4°F) as applicable, before the terminals are connected.		N/A
<b>9.4</b>	A cell is to be tested individually unless the cell manufacturer indicates that it is intended for use in series or parallel. For series or parallel use, additional tests on five sets of batteries are to be conducted using the maximum number of cells to be covered for each configuration as specified by the manufacturer.		N/A

<b>UL 2054:2004 R9.11</b>			
Clause	Requirement + Test	Result - Remark	Verdict
<b>9.5</b>	A cell is to be tested without the assistance of protective devices unless such protective devices are integral to the cell construction. When a protective device actuates during the test, the test shall be repeated with the cell connected to the maximum load that does not cause the protective device to open.		N/A
<b>9.6</b>	The samples shall not explode or catch fire. The temperature of the exterior cell or battery casing shall not exceed 150°C (302°F) for lithium chemistries.		N/A
<b>9.7</b>	Battery packs shall comply with 9.8 — 9.12.  Exception: Battery packs consisting of a single cell, in which the cell has already been subjected to the tests in 9.1 – 9.6 need not be subjected to the tests in 9.8 – 9.12		P
<b>9.8</b>	Each fully charged test sample battery pack, in turn, is to be short-circuited by connecting the positive and negative terminals of the battery with a circuit load having a resistance load of $80 \pm 20$ m ohm. The temperature of the battery case is to be recorded during the test. The battery is to discharge until a fire or explosion is obtained, or until it is completely discharged and/or the cell case temperature has returned to $\pm 10^\circ\text{C}$ ( $\pm 18^\circ\text{F}$ ) of ambient temperature.	Tested complied.	P
<b>9.9</b>	Tests are to be conducted at $20 \pm 5^\circ\text{C}$ ( $68 \pm 9^\circ\text{F}$ ) and at $55 \pm 5^\circ\text{C}$ ( $131 \pm 4^\circ\text{F}$ ). The batteries are to reach equilibrium at $20 \pm 5^\circ\text{C}$ ( $68 \pm 9^\circ\text{F}$ ) or $55 \pm 5^\circ\text{C}$ ( $131 \pm 4^\circ\text{F}$ ), as applicable, before the terminals are connected.	Tested complied.	P
<b>9.10</b>	Battery pack constructions are to be subjected to a single fault across any protective device in the load circuit of the battery under test. When protective devices actuate during the test, the test shall be repeated with the battery pack connected to the maximum load that does not cause the protective devices to open.  Exception: A positive temperature coefficient device which complies with the tests specified in Standard for Thermistor-Type Devices, UL 1434, the Standard for Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements, UL 60730-1A, or other protective devices determined to be reliable, may remain in the circuit without being faulted. See Appendix A for additional component standards.	A single fault applied. A PTC (F1) is used.  The maximum load discharge current is adjusted to 1.9A (Short circuit MOS)	P

<b>UL 2054:2004 R9.11</b>			
Clause	Requirement + Test	Result - Remark	Verdict
<b>9.11</b>	One of the above five test sample battery packs, tested at 20 ±5°C (68 ±9°F) shall be evaluated with the following additional conditions in place. The terminals are to be subjected to a short circuit condition with a minimum length of 16 AWG (1.3 mm <sup>2</sup> ) bare copper wire. The test is to be conducted on a tissue paper covered soft wood surface and the sample battery pack and bare conductor is to be covered with a single layer of cheesecloth.	One sample additionally tested with 1.3mm <sup>2</sup> bare copper wire.	P
<b>9.12</b>	For all samples tested, the samples shall not explode or catch fire and the tests shall not result in chemical leaks caused by cracking, rupturing or bursting of the cell casing. The temperature of the internal cell casings shall not exceed 150°C (302°F) for lithium chemistries. For battery pack samples tested in accordance with 9.11, the cheesecloth and tissue paper shall not catch fire.	No explosion, no fire, chemical leakage, the measured temperature not exceeding 150°C, also see appended table.	P
<b>10</b>	<b>Abnormal Charging Test</b>		P
<b>10.1</b>	Primary batteries (for example: cells, single cell batteries, or battery packs) shall comply with 10.2 –10.5  (Secondary battery pack)		N/A
<b>10.2</b>	Batteries discharged to the manufacturer's rated capacity 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
<b>10.3</b>	Each fully discharged test sample battery is to be subjected to a charging current of three times the current I <sub>c</sub> , specified by the manufacturer by connecting it in opposition to a dc-power supply. The test time is to be calculated using the formula: $t_c = \frac{2.5C}{3(I_c)}$ , in which  t <sub>c</sub> is the charging time in hour  C is the capacity of the cell/batteiy in ampere-hours, and  I <sub>c</sub> is the maximum charging current, in amperes, specified by the manufacturer.  The minimum charging time is to be 7 hours. Exception: At the manufacturer's discretion, test currents greater than the specified three times rated I <sub>c</sub> can be applied to expedite the test timeframe, with the minimum charging times as 7 hours.		N/A

<b>UL 2054:2004 R9.11</b>			
Clause	Requirement + Test	Result - Remark	Verdict
<b>10.4</b>	When a protective device that has been investigated for the purpose, actuates during the test, the test shall be repeated with the battery supply connected to the maximum load that does not cause the protective device to open. A protective device that has not been investigated for the purpose shall be short-circuited.		N/A
<b>10.5</b>	The samples shall not explode or catch fire. For battery pack samples, tests shall not result in chemical leaks caused by cracking, rupturing or bursting of the battery casing.		N/A
<b>10.6</b>	Secondary cells shall comply with 10.7 – 10.9 (UL approved battery cell used in the EUT according to UL1642)		N/A
<b>10.7</b>	The cells are to be tested in an ambient temperature of $20 \pm 5^{\circ}\text{C}$ ( $68 \pm 9^{\circ}\text{F}$ ). Each battery shall be discharged at a constant current of 0.2 C/1 hour, to a manufacturer specified discharge endpoint voltage		N/A
<b>10.8</b>	The cells are to be charged with a constant maximum specified charger output voltage and a current limit of three times the maximum current $I_c$ , specified by the manufacturer. Charging duration is the time required to reach the manufacturer's specified end-of-charge condition plus seven additional hours.		N/A
<b>10.9</b>	A cell is to be tested without the assistance of protective devices, unless such protective devices are either integral to the cell constructions or have been investigated for the purpose. A re-settable protective device that actuates during the test shall be allowed to reset and the test shall be resumed, cycling as often as necessary to complete the test. When a protective device operates during the test (whether re-settable or not) the test is repeated with the same charging time, but with the cell connected to the maximum load that does not cause the protective devices to operate. A protective device that is not integral to the cell and that has not been investigated for the purpose is to be short-circuited.		N/A
<b>10.9.1</b>	The samples shall not explode or catch fire		N/A
<b>10.10</b>	Secondary battery packs shall comply with 10.11 — 10.13.		P
<b>10.11</b>	The batteries are to be tested in an ambient temperature of $20 \pm 5^{\circ}\text{C}$ ( $68 \pm 9^{\circ}\text{F}$ ). A thermocouple is to be attached to the cells of each test sample battery. Each battery shall be discharged at a constant current of 0.2C/1 hour, to a manufacturer specified discharge endpoint voltage.	Discharge with 140mA to endpoint voltage 3.0V (the voltage of cell).	P

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Clause	Requirement + Test	Result - Remark	Verdict
<b>10.12</b>	<p>Each of the test sample batteries are to be subjected to the following overcharge conditions, in sequential order.</p> <p>a) The battery is to be initially charged using a constant current charging mode with a current limit of three times the maximum current <math>I_c</math>, specified by the manufacturer until the maximum specified charger output voltage is reached. At that point, the battery is to be charged with a constant maximum specified charger output voltage and a current limit of three times the maximum current <math>I_c</math>. Charging duration is the time required to reach the manufacturer's specified end-of-charge condition plus seven additional hours. The temperature on the cell casing shall be monitored. A re-settable protective device such as a PTC that actuates during the test shall be allowed to reset and the test shall be resumed, cycling as often as necessary, but no less than 10 times, to complete the test. Automatic reset devices are allowed to cycle during the test. When an overcurrent protective device operates during the test, the test is repeated with the same charging time, but with the battery connected to the maximum load that does not cause the protective devices to operate.</p> <p>b) The charge condition in accordance with (a) shall be conducted with each single component fault that is likely to occur in the charging circuit and which would result in overcharging of the battery.</p> <p>Exception No. 1: A protective device determined to be reliable may remain in the circuit without being faulted. See 2.4 and Appendix A.</p> <p>Exception No. 2: For batteries without protective devices, the overcharge condition(s) in (b) do not apply.</p>	<p>The charge current is <math>3 \cdot \max. I_c = 3 \cdot 0.7A = 2.1A</math></p> <p>Charging duration is the time required to reach the manufacturer's specified end-of-charge condition plus seven additional hours. (PTC was reset 10 times to complete the test)</p>	P
<b>10.13</b>	<p>The samples shall not explode or catch fire. For battery pack samples, tests shall not result in chemical leaks caused by cracking, rupturing or bursting of the internal cell casing.</p>	<p>No explosion, fire or chemical leak, also see appended table.</p>	P
<b>11</b>	<p><b>Abusive Overcharge Test</b> (UL approved battery cell used in the EUT according to UL1642)</p>		P
<b>11.1</b>	<p>The batteries are to be tested in an ambient temperature of <math>20 \pm 5^\circ C</math> (<math>68 \pm 9^\circ F</math>).</p>		P

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Clause	Requirement + Test	Result - Remark	Verdict
<b>11.2</b>	Sample batteries are to be subjected to a constant charging current at 10 times the C5 amp rate, using a supply voltage sufficient to maintain the 10 times C5 amp rate throughout the duration of the test. During the test, the temperature is to be measured on the internal cell casing of each sample. The test is to continue until the cell or battery explodes, vents, or a single operation protective device operates, and the temperature of the internal cell casing reaches steady state conditions or returns to ambient. If a PTC or other re-settable protection device operates during the test, it is to be reset a minimum of 10 times during the test. An automatic reset device is allowed to cycle during the test	Tested with constant current 1.4A (4 samples), and 0.7A (1 sample).  (Battery vented)	P
<b>11.3</b>	During the tests, batteries supplied with protective devices shall be subjected to a single component fault using any single fault condition which is likely to occur in the charging circuit and which would result in overcharging of the battery  Exception: Protective devices determined to be reliable, may remain in the circuit without being faulted. See Appendix A.	The current cut-off was used in protective circuit and it was reset 10 times during the test.	P
<b>11.4</b>	The samples shall not explode or catch fire.	No explosion or fire, also see appended table.	P
<b>11.5</b>	At least one of the five samples shall be subjected to the test outlined in 11.2 and 11.3 with a constant current charge 5 times the C5 rate (for example: at the C rate) with a supply voltage sufficient to maintain that rate throughout the duration of the test	Tested with constant current 0.7A.	P
<b>12</b>	<b>Forced-Discharged Test</b>		N/A
<b>12.1</b>	This test is intended for cells that are to be used in multicell applications, such as battery packs. The batteries are to be tested in an ambient temperature of 20 ±5°C (68 ±9°F).	Single cell of battery.	N/A
<b>12.2</b>	For multi-cell series configurations without parallel strings a fully discharged cell is to be force-discharged by connecting it in series with fully charged cells of the same kind. The number of fully charged cells to be connected in series with the discharged cell is to equal the total number of cells in the pack less one		N/A
<b>12.3</b>	For multi-cell series configurations with parallel strings, a fully discharged parallel string is to be force-discharged by connecting it in series with fully charged cells of the same kind. The number of fully charged cells to be connected in series with the discharged parallel string is to equal the total number of cells in the pack less the number of cells in the discharged parallel string		N/A
<b>12.4</b>	Each of the five battery packs shall be prepared as described in 12.2 or 12.3, as applicable.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
<b>12.5</b>	Once the completely discharged cells (or string of cells) are connected in series with the specified number of fully charged cells, the resultant battery pack is to be short circuited.		N/A
<b>12.6</b>	The positive and negative terminals of the sample are to be connected with a copper wire with a resistance load of $80 \pm 20$ m ohms. The battery is to discharge until a fire or explosion is obtained, or until it has reached a completely discharged state and the cell case temperature has returned to $\pm 10^{\circ}\text{C}$ ( $\pm 18^{\circ}\text{F}$ ) of ambient temperature		N/A
<b>12.7</b>	<p>During the tests, batteries supplied with protective devices shall be subjected to a single component fault using any single fault condition which is likely to occur in the discharge circuit and which would result in excessive discharge of the battery.</p> <p>Exception: A positive temperature coefficient device which complies with the applicable tests specified in the Standard for Thermistor-Type Devices, UL 1434 and the Standard for Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements, UL 60730-1A, or other protective devices determined to be reliable, may remain in the circuit without being faulted. See Appendix A for additional component standards.</p>		N/A
<b>12.8</b>	The samples shall not explode or catch fire.	No explosion or fire	N/A
<b>13</b>	<b>Limited Power Source Test</b> (See test in clause 2.5 in Attachment 1)		N/A
<b>13.1</b>	The batteries are to be tested in an ambient temperature of $20 \pm 5^{\circ}\text{C}$ ( $68 \pm 9^{\circ}\text{F}$ ).	Not request by client	N/A



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Clause	Requirement + Test	Result - Remark	Verdict
<b>13.2</b>	<p>A battery intended to be a limited power source shall comply with one of the following:</p> <p>a) The output is inherently limited in compliance with Table 13.1; or</p> <p>b) A linear or nonlinear impedance limits the output in compliance with Table 13.1. If a positive temperature coefficient device is used, it shall:</p> <p>1) Comply with the Standard for Thermistor-Type Devices, UL 1434, or</p> <p>2) Pass the tests specified in the Manufacturing Deviation and Drift Section, the Endurance Section, and the Manufacturing Deviation and Drift Section and the Endurance Section in the Annex for Requirements for Controls Using Thermistors of the Standard for Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements, UL 60730-1; or</p> <p>3) Meet the requirements in the Standard for Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements, UL 60730-1 for a device for Type 2.AL Action;</p> <p>c) A regulating network or an integrated circuit (IC) current limiter, limits the output in compliance with Table 13.1, both under normal operating conditions and after any simulated single fault in the regulating network or IC current limiter (open circuit or short circuit); or</p> <p>d) An overcurrent protective device is used and the output is limited in compliance with Table 13.2.</p>		N/A
<b>13.3</b>	Where an overcurrent protective device is used, it shall be a fuse or a non-adjustable, nonautoreset, electromechanical device.		N/A
<b>13.4</b>	Batteries shall be fully charged when conducting the measurements for $U_{oc}$ , $I_{sc}$ , and $S$ according to Tables 13.1 and 13.2.		N/A
<b>13.5</b>	The non-capacitive load referenced in Tables 13.1 and 13.2 shall be adjusted to develop maximum measured values of current ( $I_{sc}$ ) and power ( $S$ ) that can be obtained over the time limits noted in Tables 13.1 and 13.2. Simulated faults in a regulating network required according to 13.2 item (c) above are applied under these load conditions.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
<b>13.6</b>	Batteries that meet the limited power source requirements may be marked "Limited Power Source" "LPS" to indicate that they are considered to be a limited power source. Batteries that do not meet these requirements, regardless of terminal design, shall not be marked to indicate that they are a limited power source and are restricted to applications where a limited power source is not required	No "Limited Power Source" "LPS" mark in the label.  It is designed by the client.	N/A
<b>13A</b>	<b>Battery Pack Component Temperature Test</b>		P
<b>13A.1</b>	A battery pack with enclosure shall be subjected to a normal temperature test under both input (charging) and output (discharging) conditions. As a result of this testing, temperatures on temperature sensitive components shall not exceed the limits outlined in Table 13A.1		P
<b>13A.2</b>	For the output loading temperature test, a fully charged battery pack shall be subjected to a constant resistive loading across the output terminals of the pack with the output load current set to just below the operating limit of the discharging protection circuit. Temperatures are monitored until thermal stabilization or until the pack is at its specified endpoint voltage, whichever comes first.	The maximum discharge current is 1.87A.  (about 2-3mins, PTC operated).	P
<b>13A.3</b>	The input loading temperature test shall be conducted on a fully discharged battery pack, discharged at a constant current of 0.2C/1 hour to a manufacturer specified discharge endpoint voltage.	Discharge with 140mA to 3.0V.	P
<b>13A.4</b>	For the input loading temperature test, a fully discharged sample shall be subjected to a CCCV charging method with the maximum charging voltage not to exceed the manufacturer's recommended maximum charging voltage limits. During the test, the charging current shall not exceed three times the maximum charge current or the operating limit of the charging protection circuit, whichever is less, during the test. Temperatures are monitored until thermal stabilization or until the pack is at its fully charged state, whichever comes first.	CC=1.94A, CV=4.2V (about 2-3mins, PTC operated).	P
<b>13A.5</b>	Temperatures are considered to be stabilized when three successive readings taken at intervals of 10 percent of the previously elapsed duration of the test, but not less than 15 minutes, indicate no further increase.	Tested as required.	P
<b>13A.6</b>	Protective devices within the pack shall not operate during the test.	Tested as required.	P
<b>13A.7</b>	Temperatures are monitored on surfaces of components using thermocouples. Thermocouples are to consist of 30 AWG wires. Larger size wires may be used, but they shall not exceed 24 AWG and shall not be large enough to result in a heat sink condition on the part under test.	Tested as required.	P

<b>UL 2054:2004 R9.11</b>			
Clause	Requirement + Test	Result - Remark	Verdict
<b>13A.8</b>	During the normal temperature test, temperature measurement T shall not exceed ( $T_{max} + T_{amb} - T_{ma}$ )	See appended table.	P
<b>13B</b>	<b>Battery Pack Surface Temperature Test</b>		P
<b>13B.1</b>	A battery pack with enclosure shall be subjected to a normal temperature test under both input (charging) and output (discharging) conditions.		P
<b>13B.2</b>	For the output loading temperature test, a fully charged battery pack shall be subjected to a constant resistive loading across the output terminals of the pack with the output load current set to just below the operating limit of the discharging protection circuit. Temperatures are monitored until thermal stabilization or until the pack is at its specified endpoint voltage, whichever comes first.	The maximum discharge current is 1.87A.  (about 10mins, PTC operated).	P
<b>13B.3</b>	The input loading temperature test shall be conducted on a fully discharged battery pack, discharged at a constant current of 0.2C/1 hour to a manufacturer specified discharge endpoint voltage.	Discharge with 140mA to 3.0V.	P
<b>13B.4</b>	For the input loading temperature test, a fully discharged sample shall be subjected to a CCCV charging method with the maximum charging voltage not to exceed the manufacturer's recommended maximum charging voltage limits. During the test, the charging current shall not exceed three times the maximum charge current or the operating limit of the charging protection circuit, whichever is less, during the test. Temperatures are monitored until thermal stabilization or until the pack is at its fully charged state, whichever comes first.	CC=1.94A, CV=4.2V (about 2-3mins, PTC operated).	P
<b>13B.5</b>	Temperatures are considered to be stabilized when three successive readings taken at intervals of 10 percent of the previously elapsed duration of the test, but not less than 15 minutes, indicate no further increase.	Tested as required.	P
<b>13B.6</b>	Protective devices within the pack shall not operate during the test.	Tested as required.	P
<b>13B.7</b>	Temperatures are monitored on the accessible surfaces of the pack enclosure using thermocouples. Thermocouples are to consist of 30 AWG wires. Larger size wires may be used, but they shall not exceed 24 AWG.	Tested as required.	P
<b>13B.8</b>	During the normal temperature test, temperature measurement T shall not exceed ( $T_{max} + T_{amb} - T_{ma}$ )	See appended table 13B.	P
<b>MECHANICAL TESTS</b>			
<b>14</b>	<b>Crush Test</b>  The component cell has approved by TUV-RH according to UL1642.		N/A
<b>14.1</b>	The batteries are to be tested in an ambient temperature of $20 \pm 5^{\circ}\text{C}$ ( $68 \pm 9^{\circ}\text{F}$ ).		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
<b>14.2</b>	A battery is to be crushed between two flat surfaces. The force for the crushing is to be applied by a hydraulic ram or similar force mechanism. The flat surfaces are to be brought in contact with the cells and the crushing is to be continued until an applied force of $13 \pm 1.0$ KN ( $3000 \pm 224$ pounds) is reached. Once the maximum force has been obtained, it is to be released		N/A
<b>14.3</b>	A cylindrical or prismatic battery is to be crushed with its longitudinal axis parallel to the flat surfaces of the crushing apparatus. A prismatic battery is also to be rotated 90 degrees around its longitudinal axis so that both the wide and narrow sides will be subjected to the crushing force. Each sample battery is to be subjected to a crushing force in only one direction. Separate samples are to be used for each test.		N/A
<b>14.4</b>	A coin or button battery is to be crushed with the flat surface of the battery parallel with the flat surfaces of the crushing apparatus.		N/A
<b>14.5</b>	The samples shall not explode or catch fire.		N/A
<b>15</b>	<b>Impact Test</b> The component cell has approved by TUV-RH according to UL1642.		N/A
<b>15.1</b>	The batteries are to be tested in an ambient temperature of $20 \pm 5^{\circ}\text{C}$ ( $68 \pm 9^{\circ}\text{F}$ ).		N/A
<b>15.2</b>	A test sample battery is to be placed on a flat surface. A 15.8 mm (5/8 inch) diameter bar is to be placed across the center of the sample. A $9.1 \pm 0.46$ kg ( $20 \pm 1$ pound) weight is to be dropped from a height of $610 \pm 25$ mm ( $24 \pm 1$ inch) onto the sample.		N/A
<b>15.3</b>	A cylindrical or prismatic battery is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of a 15.8 mm (5/8 inch) diameter curved surface lying across the center of the test sample. A prismatic battery is also to be rotated 90 degrees around its longitudinal axis so that both the wide and narrow sides will be subjected to the impact. Each sample battery is to be subjected to only a single impact. Separate samples are to be used for each test.		N/A
<b>15.4</b>	A coin or button battery is to be impacted with the fiat surface of the test sample parallel to the flat surface and the 15.8 mm (5/8 inch) diameter curved surface lying across its center.		N/A
<b>15.5</b>	The samples shall not explode or catch fire.		N/A
<b>16</b>	<b>Shock Test</b> The component cell has approved by TUV-RH according to UL1642.		N/A

<b>UL 2054:2004 R9.11</b>			
Clause	Requirement + Test	Result - Remark	Verdict
<b>16.1</b>	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. 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. 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). The peak acceleration shall be between 125 and 175 g Cells shall be tested at a temperature of 20 ±5°C (68 ±9°F).		N/A
<b>16.2</b>	The samples shall not explode or catch fire.		N/A
<b>16.3</b>	The sample shall be examined 6 hours after testing and shall not vent or leak as described in 5.2.		N/A
<b>17</b>	<b>Vibration Test</b>  The component cell has approved by TUV-RH according to UL1642.		N/A
<b>17.1</b>	The batteries are to be tested in an ambient temperature of 20 ±5°C (68 ±9°F).		N/A
<b>17.2</b>	A battery is to be subjected to simple harmonic motion with an amplitude of 0.8 mm (0.03 inch) [1.6 mm (0.06 inch) total maximum excursion].		N/A
<b>17.3</b>	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. For a battery that has only two axes of symmetry, the battery is to be tested perpendicular to each axis.		N/A
<b>17.4</b>	The samples shall not explode or catch fire.		N/A
<b>17.5</b>	The sample shall be examined 6 hours after testing and shall not vent or leak as described in 5.2.		N/A
<b>BATTERY ENCLOSURE TESTS</b>			
<b>18</b>	<b>General</b>	<b>(Requested by client)</b>	P
<b>18.1</b>	The batteries are to be tested in an ambient temperature of 20 ±5°C (68 ±9°F).		P
<b>18.2</b>	Batteries with outer plastic enclosures shall be subjected to the tests described in Sections 19, 20, and 21. Batteries with outer enclosures made from materials other than plastic, shall be subjected to the tests described in Sections 19 and 21		P
<b>19</b>	<b>250 N Steady Force Test</b>		P
<b>19.1</b>	The batteries are to be tested in an ambient temperature of 20 ±5°C (68 ±9°F).	Tested as required.	P

<b>UL 2054:2004 R9.11</b>			
Clause	Requirement + Test	Result - Remark	Verdict
<b>19.2</b>	External enclosures of the battery pack are to be subjected to a steady force of 250 ±10 N (56 ±2 pounds force) for a period of 5 seconds, applied in turn to the top, bottom and sides of the battery pack enclosure by means of a suitable test tool providing contact over a circular plane surface 30 mm (1.2 inches) in diameter.	Tested as required.	P
<b>19.3</b>	The samples shall not explode or catch fire. The outer battery enclosure shall not crack to the extent that the cells or any protective devices are exposed. Openings in the enclosure created as a result of application of the 250 N steady force shall meet the criteria of 4.1.5	No explosion, no fire, and no crack.	P
<b>19.4</b>	The sample shall be examined 6 hours after testing and shall not vent or leak as described in 5.2.	Verified, no vent or leakage.	P
<b>20</b>	<b>Mold Stress Relief Test</b>		P
<b>20.1</b>	Each of three samples are to be placed in a full-draft circulating-air oven maintained at a uniform temperature of 70°C (158°F). The samples are to remain in the oven for 7 hours.  Exception: If the maximum temperature, T, recorded on the battery pack thermoplastic enclosure parts, obtained during the normal temperature test of Section 13A exceeds 60°C (140°F), then the oven temperature is to be maintained at a temperature equal to T + 10°C (50°F).	Tested as required.	P
<b>20.2</b>	Deleted effective November 11, 2011		N/A
<b>20.2.1</b>	To prevent hazards from overheating energized cells, samples shall either be fully discharged prior to conditioning or provided with "dummy" cells, which are representative of the actual cells		N/A
<b>20.3</b>	After careful removal from the oven and after returning to room temperature following the conditioning described in 20.3, the samples shall show no evidence of mechanical damage that would result in damage to cells or protective circuitry. In addition, The battery enclosures shall not crack, warp, or melt to the extent that the cells or any protective devices are exposed. Openings in the enclosure created as a result of the conditioning shall meet the criteria of 4.1.5	No explosion, fire, vent, leakage or crack.	P
<b>21</b>	<b>Drop Impact Test</b>		P

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Clause	Requirement + Test	Result - Remark	Verdict
<b>21.1</b>	The batteries are to be tested in an ambient temperature of 20 ±5°C (68 ±9°F) Exception: Battery packs employing plastic enclosures that are intended for use in 0°C (32°F) temperatures shall be conditioned for 3 hours at 0°C (or temperature specified if lower than 0°C) prior to conducting the drop test, which shall be conducted immediately after removing the samples from the cold conditioning.	Tested as required.	P
<b>21.2</b>	Each of three samples is to be dropped from a height of 1 m (3.28 ft) so it strikes a concrete surface in the position that is most likely to produce the adverse results in 21.3. Each sample is to be dropped ,three times	Tested as required.	P
<b>21.3</b>	The samples shall not explode or catch fire.	No explosion, no fire.	P
<b>21.4</b>	The sample shall be examined 6 hours after testing and shall not vent or leak as described in 5.2, and the integrity of the protective devices shall be maintained	Complied.	P
<b>21.5</b>	The outer battery enclosure shall not crack to the extent that cells or any protective devices are exposed. Openings in the enclosure created as a result of the drop impact(s) shall meet the criteria of 4.1.5	Complied.	P
<b>FIRE EXPOSURE TESTS</b>			
<b>22</b>	<b>Projectile Test</b> The component cell has approved by TUV-RH according to UL1642.		N/A
<b>22.1</b>	When subjected to the test described in 22.2 — 22.5 no part of an exploding cell or battery shall create a hole in the wire screen cage or penetrate the wire screen cage such that some or all of the cell or battery protrudes through the screen cage.		N/A
<b>22.2</b>	Each test sample cell or battery is to be placed on a screen that covers a 102 mm (4 inch) diameter hole in the center of a platform table. The screen is to be constructed of steel wire mesh having 20 openings per inch (25.4 mm) and a wire diameter of 0.43 mm (0.017 inch).		N/A
<b>22.3</b>	The screen is to be mounted 38 mm (1-1/2 inch) above a burner. The fuel and air flow rates are to be set to provide a bright blue flame that causes the supporting screen to glow a bright red.		N/A
<b>22.4</b>	An eight-sided covered wire cage, 610 mm (2 feet) across and 305 mm (1 foot) high, made from metal screening is to be placed over the test sample. See Figure 22.1. The metal screening is to be constructed from 0.25 mm (0.010 inch) diameter aluminum wire with 16— 18 wires per inch (25.4 mm) in each direction.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
<b>22.5</b>	The sample is to be heated and shall remain on the screen until it explodes or the cell or battery has ignited and burned out. It is not required to secure the sample in place unless it is at risk of falling off the screen before the test is completed. When required, the sample shall be secured to the screen with a single wire tied around the sample.		N/A
<b>ENVIRONMENTAL TESTS</b>			
<b>23</b>	<b>Heating Test</b> The component cell has approved by TUV-RH according to UL1642.		N/A
<b>23.1</b>	The sample shall not explode or catch fire when subjected to the test described in 23.2 — 23.4.		N/A
<b>23.2</b>	A battery is to be heated in a gravity convection or circulating air oven with an initial temperature of 20 ±5°C (68 ±9° F).		N/A
<b>23.3</b>	The temperature of the oven is to be raised at a rate of 5 ±2°C (9 ±3.6° F) per minute to a temperature of 130 ±2°C (266 ±3.6°F) and remain at that temperature for 10 minutes.		N/A
<b>23.4</b>	The sample shall return to room temperature (20 ±5°C) and then be examined.		N/A
<b>24</b>	<b>Temperature Cycling Test</b> The component cell has approved by TUV-RH according to UL1642.		N/A
<b>24.1</b>	The batteries are to be placed in a test chamber and subjected to the following cycles: a) Raising the chamber-temperature to 70 ±3°C (158 ±5°F) within 30 minutes and maintaining this temperature for 4 hours. b) Reducing the chamber temperature to 20 ±3°C (68 ±5°F) within 30 minutes and maintaining this temperature for 2 hours. c) Reducing the chamber temperature to minus 40 ±3°C (minus 40 ±5°F) within 30 minutes and maintaining this temperature for 4 hours. d) Raising the chamber temperature to 20 ±3°C (68 ±5°F) within 30 minutes. e) Repeating the sequence for a further 9 cycles. f) After the 10th cycle, storing the batteries for a minimum of 24 hours at 20 ±5°C (68 ±9°F) prior to examination		N/A
<b>24.2</b>	The samples shall not explode or catch fire. In addition, the samples shall not vent or leak as described in 5.2.		N/A
<b>MARKING</b>			
<b>25</b>	<b>General</b>		P



<b>UL 2054:2004 R9.11</b>			
Clause	Requirement + Test	Result - Remark	Verdict
<b>25.1</b>	<p>A battery shall be legibly and permanently marked with:</p> <p>a) The manufacturer's name, trade name, or trademark or other descriptive marking by which the organization responsible for the product may be identified;</p> <p>b) A distinctive ("catalog" or "model") number or the equivalent;</p> <p>c) The electrical rating in Vdc and Ah. (Secondary lithium batteries may be marked in Wh rather than Ah); and</p> <p>d) The date or other dating period of manufacture not exceeding any three consecutive months</p> <p>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</p> <p>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:</p> <p>a) Does not repeat in less than 10 years , and</p> <p>b) Does not require reference to the production records of the manufacturer to determine when the product was manufactured.</p>	See marking plate.	P
<b>25.2</b>	When a manufacturer produces the battery at more than one factory, each battery shall have a distinctive marking to identify it as the product of a particular factory.	One factory only.	N/A
<b>25.3</b>	<p>A battery or the smallest unit package or instructions provided with each battery shall include the following statements or equivalent:</p> <p>a) An attention word, such as "Caution", "Warning", or "Danger"</p> <p>b) A brief description of possible hazards associated with mishandling of the battery, such as burn hazard, fire hazard, explosion hazard.</p> <p>c) A list of actions to take to avoid possible hazards, such as do not crush, disassemble, dispose of in fire, or similar actions, and for primary batteries, do not charge.</p> <p>d) Instructions regarding replacement batteries if the batteries are replaceable by the user</p>	Information for safety mentioned in manufacturer's specifications.	P

<b>UL 2054:2004 R9.11</b>			
Clause	Requirement + Test	Result - Remark	Verdict
<b>25.3.1</b>	<p>A lithium ion battery pack shall be marked with the following or equivalent: "CAUTION: Risk of Fire and Burns. Do Not Open, Crush, Heat Above (manufacturer's specified maximum temperature) or Incinerate. Follow Manufacturer's Instructions" This wording or equivalent shall also be included in the instructions packaged with the battery pack</p> <p>Exception No. 1: A lithium ion battery pack not provided with an enclosure, need not be marked, but shall include the above wording or equivalent in the instructions provided with the pack</p> <p>Exception No. 2: If space does not permit marking on the battery, the marking may be on the smallest unit package.</p>		P
<b>25.4</b>	The manufacturer's specified charging instructions shall be included for secondary batteries. Primary batteries shall include instructions indicating that the batteries shall not be charged	See marking plate.	P
<b>25.5</b>	<p>A cell or battery that is less than 32 mm (1.25 inches) in diameter by 3.8 mm (0.15 in) thick shall include the following marking or equivalent on the smallest unit package or instructions provided with each cell or battery:</p> <p><b>"Caution — Never put batteries in mouth. If swallowed, contact your physician or local poison control center."</b></p>		N/A
<b>25.6</b>	Batteries which meet the requirements of the Limited Power Source Test, Paragraph 13.4, may include the Marking "Limited Power Source" or "LPS"	No "Limited Power Source" "LPS" mark in the label.	N/A

**Critical Components**

Material: e.g. external enclosure, PCB, closed-end connector, sleeves, cord anchorage etc

Components with winding: e.g. motor, transformer, magnetic coil etc.

Other components: e.g. switch, thermostat, heater, plug, internal wire, capacitor, relay, varistor etc.

Object/part No.	Manufacturer/ trademark	Type/ model	Technical data	Standard	Mark(s) of conformity
IC (U1)	SII	G3J	VCU=4.28±0.025V, VDL=3.0±0.05V	--	Tested with appliance
MOSFET (U2)	FORTUNE	FS8820P	VDS=20V, ID=6.5A	--	Tested with appliance
PCB	Interchangeable	Interchangeable	V-0, Min. 130°C	UL 796	UL approved
Output wire	Interchangeable	Interchangeable	Min. 24AWG, 80°C, Min. 300V, VW-1	UL 758	UL approved
Tape	Interchangeable	Interchangeable	Min. 130°C, flame retardant	UL 510	UL approved
Connector	Interchangeable	Interchangeable	Min. V-2	UL 94	UL approved
PTC	LITTELFUSE INC	microSMD175 (17)	6Vdc, Hold Current=1.75 (A), I <sub>T</sub> =3.5(A) at 25 °C.	UL 1434	UL E74889
Cells		GP503048	3.7V, 700mAh	UL 1642	TUV RH US 72162302 01
- Positive electrode		124µm	LiCoO <sub>2</sub> , PVDF, NMP, Conductive Additive, Aluminum Foil	--	--
- Negative electrode		137µm	Graphite, CMC, SBR, H <sub>2</sub> O, Conductive Additive, Copper Foil	--	--
- Separator	Senior	16µm	Thickness: 16µm, Nylon, PP, shutdown temperature: 128-135°C	--	--
- Electrolyte	Guangzhou Tinci Materials Technology Co., Ltd	TC-2011	DMC, EC, PC, EMC	--	--
- Aluminium plastic film	SHOWA DENKO K.K	0.113mm	113±10%µm	--	--

9	TABLE: Short-Circuit Test for model					P
Ambient temperature: 24.2°C						
Sample No.	006	007	008	009	010	
Cell Case temp. (°C)	--	--	--	--	--	
Battery surface temp. (°C)	56.0	53.3	55.1	54.5	54.2	
Failure Mode	No	No	No	No	No	
Faulted Protective Device	SC-MOS	SC-MOS	SC-MOS	SC-MOS	SC-MOS	
Ambient temperature: 58.7°C						
Sample No.	001	002	003	004	005	
Cell Case temp. (°C)	--	--	--	--	--	
Battery surface temp. (°C)	73.1	74.7	74.4	74.1	74.6	
Failure Mode	No	No	No	No	No	
Faulted Protective Device	SC-MOS	SC-MOS	SC-MOS	SC-MOS	SC-MOS	
Supplementary information: No explosion or fire, or chemical leak; Tmax was recorded on the centre of the outside case. The temperature of the internal cell casings does not exceed 150°C (302°F). Faulted Protective Device*: the MOS is bypassed during the test. The battery does not have plastic case.						

10	TABLE: Abnormal Charging Test for model					P
Ambient temperature: 24.1°C						
Id	0.14 A					
Ue	3.0 V					
Ic	2.1 A					
Uc	4.2 V					
Sample No.	021	022	023	024	025	
Cell Case temp. (°C)	--	--	--	--	--	
Battery surface temp. (°C)	26.4	26.1	26.1	26.1	25.8	
Failure Mode	No	No	No	No	No	
Faulted Protective Device	SC-MOS	SC-MOS	SC-MOS	SC-MOS	SC-MOS	
Supplementary information: No explosion or fire, or chemical leak; Tmax was recorded on the centre of the outside case; Faulted Protective Device*: the MOS is bypassed during the test. The current cut-off was used (inside the cell) in protective circuit.						

11	TABLE: Abusive Overcharge Test for model					P
Ambient temperature: 24.4-24.9°C						
Sample No.	015	012	013	014	011	
Ic(mA)	1400	1400	1400	1400	700	
Cell Case temp. (°C)	--	--	--	--	--	
Battery surface temp. (°C)	95.7	94.5	100.1	101.2	83.2	
Failure Mode	No	No	No	No	No	
Faulted Protective Device	SC-MOS	SC-MOS	SC-MOS	SC-MOS	SC-MOS	
Supplementary information: No explosion or fire; Tmax was recorded on the centre of the outside case; Faulted Protective Device*: the MOS is bypassed during the test. The current cut-off was used (inside the cell) in protective circuit.						

13A/13B	TABLE: Battery Pack Component Temperature Test and Battery Pack Surface Temperature Test for model					P
Ambient temperature: see belows						
13A: Battery Pack Component Temperature Test						
Sample No.	016		017		Limited T	
Testing Process	Charging	Discharging	Charging	Discharging	Charging	Discharging
Lead Wiring	27.3	27.5	26.4	24.3	80+22-45=57	80+22-60=42
Fuse	55.8	45.7	52	49.6	--	--
PCB	46.7	49.7	46.8	44.9	130+22-45=107	130+22-60=92
Cell body	28.1	37.6	26.5	35.2	100+22-45=77	100+22-60=62
Ambient	23.8	22.4	23.8	22.4	--	--
13B: Battery Pack Surface Temperature Test						
Sample No.	016		017		Limited T	
Testing Process	Charging	Discharging	Charging	Discharging	Charging	Discharging
Surface	28.1	37.6	26.5	35.2	100+22-45=77	100+22-60=62
Ambient	23.8	22.4	23.8	22.4	--	--
Supplementary information: Output load temperature test: fully charged battery discharge with 1.87A to endpoint voltage 3.0V Input load temperature test: fully discharged battery charge with 1.94A.						

19	TABLE: 250 N Steady Force Test for model			P
Ambient temperature: 24.1°C				
Sample No.	020	021	022	
Mass before test (g)	15.33	15.40	15.36	
Mass after test (g)	15.33	15.39	15.35	
Supplementary information: No vent or leak.				

20	TABLE: Mold Stress Relief Test for model			P
Ambient temperature: 70°C				
Sample No.	023	024	025	
Mass before test (g)	15.36	15.41	15.39	
Mass after test (g)	15.33	15.40	15.37	
Supplementary information: The battery enclosures dose not crack, warp, or melt to the extent that the cells or any protective devices are exposed.				

21	TABLE: Drop Impact Test for model			P
Ambient temperature: 23.4°C				
Sample No.	026	027	028	
Mass before test (g)	15.41	15.38	15.32	
Mass after test (g)	15.40	15.38	15.32	
Supplementary information: No explosion or fire.				

**--End of Report--**

<b>TEST REPORT</b> <b>IEC 60950-1</b> <b>Information technology equipment – Safety –</b> <b>Part 1: General requirements</b>	
<b>Report Number</b> .....	50048525 001
<b>Date of issue</b> .....	See cover page
<b>Total number of pages</b> .....	See cover page
<b>Applicant's name</b> .....	See cover page
<b>Address</b> .....	See cover page
<b>Test specification:</b>	
<b>Standard</b> .....	See cover page
<b>Test procedure</b> .....	See cover page
<b>Non-standard test method</b> .....	N/A
<b>Test Report Form No</b> .....	IEC60950_1F
<b>Test Report Form(s) Originator</b> .....	SGS Fimko Ltd
<b>Master TRF</b> .....	Dated 2014-02
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<b>General disclaimer:</b>	
<p>The test results presented in this report relate only to the object tested.</p> <p>This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.</p>	

<b>Test item description</b> .....:	Li-ion Polymer Battery	
<b>Trade Mark</b> .....:	N/A	
<b>Manufacturer</b> .....:	Same as applicant	
<b>Address</b> .....	Same as applicant	
<b>Model/Type reference</b> .....	BL0750F5030481S1PC*C (*=A, B, C, H, J, K, L, M, N, P, Q, R, T, U, V, 1, 2, 3, 4, 5, 6, 7, 8, 9)	
<b>Ratings</b> .....	DC3.7V, 700mAh, 2.59Wh	
<b>Testing procedure and testing location:</b>		
<input checked="" type="checkbox"/>	<b>CB Testing Laboratory:</b>	See cover page
<b>Testing location/ address</b> .....		See cover page
<input type="checkbox"/>	<b>Associated CB Testing Laboratory:</b>	
<b>Testing location/ address</b> .....		
<b>Tested by (name + signature)</b> ..... :		See cover page
<b>Approved by (name + signature)</b> ..... :		See cover page
<input type="checkbox"/>	<b>Testing procedure: TMP/CTF Stage 1:</b>	
<b>Testing location/ address</b> .....		
<b>Tested by (name + signature)</b> ..... :		
<b>Approved by (name + signature)</b> ..... :		
<input type="checkbox"/>	<b>Testing procedure: WMT/CTF Stage 2:</b>	
<b>Testing location/ address</b> .....		
<b>Tested by (name + signature)</b> ..... :		
<b>Witnessed by (name + signature)</b> .....		
<b>Approved by (name + signature)</b> ..... :		
<input type="checkbox"/>	<b>Testing procedure: SMT/CTF Stage 3 or 4:</b>	
<b>Testing location/ address</b> .....		
<b>Tested by (name + signature)</b> ..... :		
<b>Witnessed by (name + signature)</b> .....		
<b>Approved by (name + signature)</b> ..... :		
<b>Supervised by (name + signature)</b> ..... :		



<b>Summary of testing:</b>													
<p><b>Tests performed (name of test and test clause):</b></p> <ol style="list-style-type: none"> <li>1. The maximum ambient temperature permitted by the manufacturer's specification is charge condition 45°C, discharge condition 60°C.</li> <li>2. Operation altitude above sea level: &lt;500m.</li> <li>3. Following tests performed during evaluation</li> </ol> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="text-align: left; padding: 2px;">Clause(s)</th> <th style="text-align: left; padding: 2px;">Test(s)</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">1.7.11</td> <td style="padding: 2px;">Durability of Marking Test</td> </tr> <tr> <td style="padding: 2px;">2.5</td> <td style="padding: 2px;">Limited power source measurement</td> </tr> <tr> <td style="padding: 2px;">4.3.8</td> <td style="padding: 2px;">Battery Test</td> </tr> <tr> <td style="padding: 2px;">4.5.2</td> <td style="padding: 2px;">Thermal requirements</td> </tr> <tr> <td style="padding: 2px;">5.3</td> <td style="padding: 2px;">Fault Condition Test</td> </tr> </tbody> </table> <p style="margin-top: 10px;">For the purpose of the tests, charge and discharge conditions of the battery were performed by using of laboratory unlimited current source and electronic load.</p>	Clause(s)	Test(s)	1.7.11	Durability of Marking Test	2.5	Limited power source measurement	4.3.8	Battery Test	4.5.2	Thermal requirements	5.3	Fault Condition Test	<p>Testing location: See cover page.</p>
Clause(s)	Test(s)												
1.7.11	Durability of Marking Test												
2.5	Limited power source measurement												
4.3.8	Battery Test												
4.5.2	Thermal requirements												
5.3	Fault Condition Test												
<p><b>Summary of compliance with National Differences</b></p> <p><b>List of countries addressed:</b> CA, US</p> <p>CA = Canada, US = United States of America.</p> <p>See the end of the test report for national differences.</p>													
<p><b>Copy of marking plate</b></p> <p>See UL 2054 report</p>													

<b>Test item particulars</b> .....:	
<b>Equipment mobility</b> .....:	<input type="checkbox"/> movable <input type="checkbox"/> hand-held <input type="checkbox"/> transportable <input type="checkbox"/> stationary <input checked="" type="checkbox"/> for building-in <input type="checkbox"/> direct plug-in
<b>Connection to the mains</b> .....:	<input type="checkbox"/> pluggable equipment <input type="checkbox"/> type A <input type="checkbox"/> type B <input type="checkbox"/> permanent connection <input type="checkbox"/> detachable power supply cord <input type="checkbox"/> non-detachable power supply cord <input checked="" type="checkbox"/> not directly connected to the mains
<b>Operating condition</b> .....:	<input checked="" type="checkbox"/> continuous <input type="checkbox"/> rated operating / resting time:
<b>Access location</b> .....	<input checked="" type="checkbox"/> operator accessible <input type="checkbox"/> restricted access location
<b>Over voltage category (OVC)</b> .....	<input type="checkbox"/> OVC I <input type="checkbox"/> OVC II <input type="checkbox"/> OVC III <input type="checkbox"/> OVC IV <input checked="" type="checkbox"/> other: Supplied by Max. DC 4.2V
<b>Mains supply tolerance (%) or absolute mains supply values</b> .....	Not directly connected to mains
<b>Tested for IT power systems</b> .....	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<b>IT testing, phase-phase voltage (V)</b> .....	N/A
<b>Class of equipment</b> .....	<input type="checkbox"/> Class I <input type="checkbox"/> Class II <input checked="" type="checkbox"/> Class III <input type="checkbox"/> Not classified
<b>Considered current rating of protective device as part of the building installation (A)</b> .....	N/A
<b>Pollution degree (PD)</b> .....	<input type="checkbox"/> PD 1 <input checked="" type="checkbox"/> PD 2 <input type="checkbox"/> PD 3
<b>IP protection class</b> .....	IPX0
<b>Altitude during operation (m)</b> .....	Up to 2000
<b>Altitude of test laboratory (m)</b> .....	<500
<b>Mass of equipment (kg)</b> .....	Approx. 0.016
<b>Possible test case verdicts:</b>	
- 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)
<b>Testing</b> .....:	
<b>Date of receipt of test item</b> .....:	See UL 2054 report
<b>Date(s) of performance of tests</b> .....	See UL 2054 report
<b>General remarks:</b>	
"(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 <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.	

**Manufacturer's Declaration per sub-clause 4.2.5 of IECCE 02:**

The application for obtaining a CB Test Certificate includes more than  **Yes**  
 one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided.....  **Not applicable**

**When differences exist; they shall be identified in the General product information section.**

**Name and address of factory (ies) .....** :

**General product information:**

The EUT is a Rechargeable Lithium-ion Battery which is intended to use for portable IT equipment. The EUT is treated and declared as IT equipment by the manufacturer, considering the realistic use environment (for example, installation or disassembly process of the battery pack from final portable IT equipment) the battery tested according to UL2054 in this report.

The Li-ion Polymer Battery mainly composed of:

- Protective Circuit Module
- Battery cell
- Connector

Model different:

The models are identical except the connectors type, see below:

Definition of variable for model BL0750F5030481S1PC\*C, the "\*" means the connector type, see below.

Variable:	Range of variable:	Content:
*	A, B, C, H, J, K, L, M, N, P, Q, R, T, U, V, 1, 2, 3, 4, 5, 6, 7, 8, 9	A = Strip + tin, B = Button, C = Contacts, H = Hirose (any style), J = 2p JST, K =3p JST, L = 4p JST, M = 2p Molex, N = 3p Molex, P = 4p Molex, Q = 6 contacts Molex, R = Multiple connectors, T= 2p Tyco, U = 3p Tyco, V = 4p Tyco, 1 = 1p connector, 2 =2p connector, 3 = 3p connector, 4 = 4p connector, 5 =5p connector, 6 = 6p connector, 7 = 7p connector, 8 =8p connector, 9 = 9p connector.

The main features of the battery pack are shown as below:

Model	Nominal capacity	Nominal voltage	Nominal Charge Current	Nominal Discharge Current	Max. Charge Current	Max. Discharge Current	Max. Charge Voltage	Cut-off Voltage
BL0750F5030481S1PC*C	700mAh	3.7Vdc	140mA	140mA	700mA	1050mA	4.2V	3.0V

**Abbreviations used in the report:**

- normal conditions	<b>N.C.</b>	- single fault conditions	<b>S.F.C</b>
- functional insulation	<b>OP</b>	- basic insulation	<b>BI</b>
- double insulation	<b>DI</b>	- supplementary insulation	<b>SI</b>
- between parts of opposite polarity	<b>BOP</b>	- reinforced insulation	<b>RI</b>

**Indicate used abbreviations (if any)**



<b>IEC 60950-1</b>			
Clause	Requirement + Test	Result - Remark	Verdict
<b>1</b>	<b>GENERAL</b>		P
<b>1.5</b>	<b>Components</b>		P
1.5.1	General		P
	Comply with UL 60950-1 or relevant component standard	(see appended tables 1.5.1)	P
1.5.2	Evaluation and testing of components	Components which are certified to IEC and/or national standards are used correctly within their ratings. Components not covered by IEC standards are tested under the conditions present in the equipment	P
1.5.3	Thermal controls	No thermal controls	N/A
1.5.4	Transformers	No transformers	N/A
1.5.5	Interconnecting cables	No interconnecting cables	N/A
1.5.6	Capacitors bridging insulation	No such capacitors	N/A
1.5.7	Resistors bridging insulation	No such components	N/A
1.5.7.1	Resistors bridging functional, basic or supplementary insulation		N/A
1.5.7.2	Resistors bridging double or reinforced insulation between a.c. mains and other circuits		N/A
1.5.7.3	Resistors bridging double or reinforced insulation between a.c. mains and antenna or coaxial cable		N/A
1.5.8	Components in equipment for IT power systems		N/A
1.5.9	Surge suppressors	No such components	N/A
1.5.9.1	General		N/A
1.5.9.2	Protection of VDRs		N/A
1.5.9.3	Bridging of functional insulation by a VDR		N/A
1.5.9.4	Bridging of basic insulation by a VDR		N/A
1.5.9.5	Bridging of supplementary, double or reinforced insulation by a VDR		N/A
<b>1.6</b>	<b>Power interface</b>		N/A
1.6.1	AC power distribution systems	Not directly connected to AC mains	N/A
1.6.2	Input current		N/A

<b>IEC 60950-1</b>			
Clause	Requirement + Test	Result - Remark	Verdict
1.6.3	Voltage limit of hand-held equipment		N/A
1.6.4	Neutral conductor	Not directly connected to mains	N/A
<b>1.7</b>	<b>Marking and instructions</b>		P
1.7.1	Power rating and identification markings	See below	P
1.7.1.1	Power rating marking		P
	Multiple mains supply connections.....:		N/A
	Rated voltage(s) or voltage range(s) (V) .....	3.7V	P
	Symbol for nature of supply, for d.c. only .....	See page 3 of UL 2054 report	P
	Rated frequency or rated frequency range (Hz) .....	DC source	P
	Rated current (mA or A) .....	DC3.7V, 700mAh, 2.59Wh marked	P
1.7.1.2	Identification markings	See below	P
	Manufacturer's name or trade-mark or identification mark .....	See page 3 of UL 2054 report	P
	Model identification or type reference .....	See page 3 of UL 2054 report	P
	Symbol for Class II equipment only .....	Class III equipment	N/A
	Other markings and symbols .....	Additional symbol or marking does not give rise to misunderstanding	P
1.7.1.3	Use of graphical symbols		N/A
1.7.2	Safety instructions and marking	English version safety instruction provided	P
1.7.2.1	General		P
1.7.2.2	Disconnect devices		N/A
1.7.2.3	Overcurrent protective device	Not type B pluggable equipment or permanently connected equipment	N/A
1.7.2.4	IT power distribution systems		N/A
1.7.2.5	Operator access with a tool	No such access required	N/A
1.7.2.6	Ozone	Ozone not used or generated	N/A
1.7.3	Short duty cycles	Equipment is designed for continuous operation	N/A
1.7.4	Supply voltage adjustment .....		N/A
	Methods and means of adjustment; reference to installation instructions .....		N/A

<b>IEC 60950-1</b>			
Clause	Requirement + Test	Result - Remark	Verdict
1.7.5	Power outlets on the equipment .....	No power outlets provided	N/A
1.7.6	Fuse identification (marking, special fusing characteristics, cross-reference) .....	No fuse used	N/A
1.7.7	Wiring terminals		N/A
1.7.7.1	Protective earthing and bonding terminals .....	Class III equipment	N/A
1.7.7.2	Terminals for a.c. mains supply conductors	Not directly connected to mains	N/A
1.7.7.3	Terminals for d.c. mains supply conductors	Not directly connected to mains	N/A
1.7.8	Controls and indicators		N/A
1.7.8.1	Identification, location and marking .....	No switches or controls	N/A
1.7.8.2	Colours .....		N/A
1.7.8.3	Symbols according to IEC 60417 .....	No such symbols used	N/A
1.7.8.4	Markings using figures .....	No indicators for different positions	N/A
1.7.9	Isolation of multiple power sources .....		N/A
1.7.10	Thermostats and other regulating devices .....	Such devices not used	N/A
1.7.11	Durability	The label was subjected to the permanence of marking test. The label was rubbed with cloth soaked with water for 15 sec. and then again for 15 sec. with the cloth soaked with petroleum spirit After this test there was no damage to the label. The marking on the label did not fade. There was no curling nor lifting of the label edge	P
1.7.12	Removable parts	No such parts	N/A
1.7.13	Replaceable batteries .....	The battery cell mounted within the enclosure is not replaceable, see the warning information for operation of battery pack in user manual. As one of elements in final product the relevant warning information should be evaluated in final system	N/A
	Language(s) .....		—
1.7.14	Equipment for restricted access locations .....		N/A

<b>IEC 60950-1</b>			
Clause	Requirement + Test	Result - Remark	Verdict
<b>2</b>	<b>PROTECTION FROM HAZARDS</b>		P
<b>2.1</b>	<b>Protection from electric shock and energy hazards</b>		P
2.1.1	Protection in operator access areas	Max. voltage DC 4.2V for the battery pack, no hazardous voltage existing in the equipment	P
2.1.1.1	Access to energized parts	See above	N/A
	Test by inspection .....		N/A
	Test with test finger (Figure 2A) .....		N/A
	Test with test pin (Figure 2B) .....		N/A
	Test with test probe (Figure 2C) .....		N/A
2.1.1.2	Battery compartments		N/A
2.1.1.3	Access to ELV wiring	No ELV wiring in operator accessible area	N/A
	Working voltage ( $V_{peak}$ or $V_{rms}$ ); minimum distance through insulation (mm)		—
2.1.1.4	Access to hazardous voltage circuit wiring	No hazardous voltage	N/A
2.1.1.5	Energy hazards .....	The max. Voltage is 4.2V and the max. current is 1.05A, thus $4.2V \times 1.05A = 4.41VA$ , which is far below the limit of 240VA	P
2.1.1.6	Manual controls	No manual controls	N/A
2.1.1.7	Discharge of capacitors in equipment	No mains circuits	N/A
	Measured voltage (V); time-constant (s) .....		—
2.1.1.8	Energy hazards – d.c. mains supply	No mains circuits	N/A
	a) Capacitor connected to the d.c. mains supply ...:		N/A
	b) Internal battery connected to the d.c. mains supply .....		N/A
2.1.1.9	Audio amplifiers .....	No audio amplifiers	N/A
2.1.2	Protection in service access areas	No service access area	N/A
2.1.3	Protection in restricted access locations		N/A
<b>2.2</b>	<b>SELV circuits</b>		P
2.2.1	General requirements	See below.	P



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Clause	Requirement + Test	Result - Remark	Verdict
2.2.2	Voltages under normal conditions (V) .....	Max. DC 4.2V input is not likely to be exceeded. Since there is no voltage boosting circuit within the product after examination.	P
2.2.3	Voltages under fault conditions (V) .....	Max. DC 4.2V, no voltage exceeding 71V peak or 120Vd.c. within 200ms, and 42.4Vpeak or 60Vd.c. after 200ms under single fault condition	P
2.2.4	Connection of SELV circuits to other circuits .....	Intended to connect to SELV circuits	P

<b>2.3</b>	<b>TNV circuits</b>	<i>No TNV circuits</i>	N/A
2.3.1	Limits		N/A
	Type of TNV circuits .....		—
2.3.2	Separation from other circuits and from accessible parts		N/A
2.3.2.1	General requirements		N/A
2.3.2.2	Protection by basic insulation		N/A
2.3.2.3	Protection by earthing		N/A
2.3.2.4	Protection by other constructions .....		N/A
2.3.3	Separation from hazardous voltages		N/A
	Insulation employed.....		—
2.3.4	Connection of TNV circuits to other circuits		N/A
	Insulation employed.....		—
2.3.5	Test for operating voltages generated externally		N/A

<b>2.4</b>	<b>Limited current circuits</b>	<i>No such circuits</i>	N/A
2.4.1	General requirements		N/A
2.4.2	Limit values		N/A
	Frequency (Hz) .....		—
	Measured current (mA).....		—
	Measured voltage (V) .....		—
	Measured circuit capacitance (nF or $\mu$ F) .....		—

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Clause	Requirement + Test	Result - Remark	Verdict
2.4.3	Connection of limited current circuits to other circuits		N/A

<b>2.5</b>	<b>Limited power sources</b>		<b>P</b>
	a) Inherently limited output		N/A
	b) Impedance limited output		N/A
	c) Regulating network or IC current limiter, limits output under normal operating and single fault condition	Test as required. See table 2.5	P
	Use of integrated circuit (IC) current limiters		N/A
	d) Overcurrent protective device limited output		N/A
	Max. output voltage (V), max. output current (A), max. apparent power (VA).....:		—
	Current rating of overcurrent protective device (A):.		—

<b>2.6</b>	<b>Provisions for earthing and bonding</b>	<i>Class III equipment</i>	<b>N/A</b>
2.6.1	Protective earthing		N/A
2.6.2	Functional earthing		N/A
	Use of symbol for functional earthing .....		N/A
2.6.3	Protective earthing and protective bonding conductors		N/A
2.6.3.1	General		N/A
2.6.3.2	Size of protective earthing conductors		N/A
	Rated current (A), cross-sectional area (mm <sup>2</sup> ), AWG .....		—
2.6.3.3	Size of protective bonding conductors		N/A
	Rated current (A), cross-sectional area (mm <sup>2</sup> ), AWG .....		—
	Protective current rating (A), cross-sectional area (mm <sup>2</sup> ), AWG .....		
2.6.3.4	Resistance of earthing conductors and their terminations; resistance (Ω), voltage drop (V), test current (A), duration (min) .....		N/A
2.6.3.5	Colour of insulation .....		N/A
2.6.4	Terminals		N/A
2.6.4.1	General		N/A
2.6.4.2	Protective earthing and bonding terminals		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Rated current (A), type, nominal thread diameter (mm) .....		—
2.6.4.3	Separation of the protective earthing conductor from protective bonding conductors		N/A
2.6.5	Integrity of protective earthing		N/A
2.6.5.1	Interconnection of equipment		N/A
2.6.5.2	Components in protective earthing conductors and protective bonding conductors		N/A
2.6.5.3	Disconnection of protective earth		N/A
2.6.5.4	Parts that can be removed by an operator		N/A
2.6.5.5	Parts removed during servicing		N/A
2.6.5.6	Corrosion resistance		N/A
2.6.5.7	Screws for protective bonding		N/A
2.6.5.8	Reliance on telecommunication network or cable distribution system		N/A
<b>2.7</b>	<b>Overcurrent and earth fault protection in primary circuits</b>		N/A
2.7.1	Basic requirements	No primary circuits	N/A
	Instructions when protection relies on building installation		N/A
2.7.2	Faults not simulated in 5.3.7		N/A
2.7.3	Short-circuit backup protection		N/A
2.7.4	Number and location of protective devices .....		N/A
2.7.5	Protection by several devices		N/A
2.7.6	Warning to service personnel .....		N/A
<b>2.8</b>	<b>Safety interlocks</b>		N/A
2.8.1	General principles		N/A
2.8.2	Protection requirements		N/A
2.8.3	Inadvertent reactivation		N/A
2.8.4	Fail-safe operation		N/A
	Protection against extreme hazard		N/A
2.8.5	Moving parts		N/A
2.8.6	Overriding		N/A
2.8.7	Switches, relays and their related circuits		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
2.8.7.1	Separation distances for contact gaps and their related circuits (mm) .....		N/A
2.8.7.2	Overload test		N/A
2.8.7.3	Endurance test		N/A
2.8.7.4	Electric strength test		N/A
2.8.8	Mechanical actuators		N/A

<b>2.9</b>	<b>Electrical insulation</b>		P
2.9.1	Properties of insulating materials	Natural rubber, asbestos or hygroscopic material not used	P
2.9.2	Humidity conditioning		N/A
	Relative humidity (%), temperature (°C) .....		—
2.9.3	Grade of insulation	Functional insulation only	P
2.9.4	Separation from hazardous voltages	No hazardous voltage	N/A
	Method(s) used .....		—

<b>2.10</b>	<b>Clearances, creepage distances and distances through insulation</b>		N/A
2.10.1	General	Class III equipment, no Cr. & Cl. requirements, see table 5.3 for single fault test (cl. 5.3.4c applied)	N/A
2.10.1.1	Frequency .....		N/A
2.10.1.2	Pollution degrees .....		N/A
2.10.1.3	Reduced values for functional insulation		N/A
2.10.1.4	Intervening unconnected conductive parts		N/A
2.10.1.5	Insulation with varying dimensions		N/A
2.10.1.6	Special separation requirements		N/A
2.10.1.7	Insulation in circuits generating starting pulses		N/A
2.10.2	Determination of working voltage		N/A
2.10.2.1	General		N/A
2.10.2.2	RMS working voltage		N/A
2.10.2.3	Peak working voltage		N/A
2.10.3	Clearances		N/A
2.10.3.1	General		N/A
2.10.3.2	Mains transient voltages		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	a) AC mains supply .....		N/A
	b) Earthed d.c. mains supplies .....		N/A
	c) Unearthed d.c. mains supplies .....		N/A
	d) Battery operation .....		N/A
2.10.3.3	Clearances in primary circuits		N/A
2.10.3.4	Clearances in secondary circuits		N/A
2.10.3.5	Clearances in circuits having starting pulses		N/A
2.10.3.6	Transients from a.c. mains supply .....		N/A
2.10.3.7	Transients from d.c. mains supply .....		N/A
2.10.3.8	Transients from telecommunication networks and cable distribution systems .....		N/A
2.10.3.9	Measurement of transient voltage levels		N/A
	a) Transients from a mains supply		N/A
	For an a.c. mains supply .....		N/A
	For a d.c. mains supply .....		N/A
	b) Transients from a telecommunication network :		N/A
2.10.4	Creepage distances		N/A
2.10.4.1	General		N/A
2.10.4.2	Material group and comparative tracking index		N/A
	CTI tests .....		—
2.10.4.3	Minimum creepage distances		N/A
2.10.5	Solid insulation		N/A
2.10.5.1	General		N/A
2.10.5.2	Distances through insulation		N/A
2.10.5.3	Insulating compound as solid insulation		N/A
2.10.5.4	Semiconductor devices		N/A
2.10.5.5.	Cemented joints		N/A
2.10.5.6	Thin sheet material – General		N/A
2.10.5.7	Separable thin sheet material		N/A
	Number of layers (pcs) .....		—
2.10.5.8	Non-separable thin sheet material		N/A
2.10.5.9	Thin sheet material – standard test procedure		N/A
	Electric strength test		—
2.10.5.10	Thin sheet material – alternative test procedure		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Electric strength test		—
2.10.5.11	Insulation in wound components		N/A
2.10.5.12	Wire in wound components		N/A
	Working voltage .....		N/A
	a) Basic insulation not under stress .....		N/A
	b) Basic, supplementary, reinforced insulation .....		N/A
	c) Compliance with Annex U .....		N/A
	Two wires in contact inside wound component; angle between 45° and 90° .....		N/A
2.10.5.13	Wire with solvent-based enamel in wound components		N/A
	Electric strength test		—
	Routine test		N/A
2.10.5.14	Additional insulation in wound components		N/A
	Working voltage .....		N/A
	- Basic insulation not under stress .....		N/A
	- Supplementary, reinforced insulation .....		N/A
2.10.6	Construction of printed boards		N/A
2.10.6.1	Uncoated printed boards		N/A
2.10.6.2	Coated printed boards		N/A
2.10.6.3	Insulation between conductors on the same inner surface of a printed board		N/A
2.10.6.4	Insulation between conductors on different layers of a printed board		N/A
	Distance through insulation		N/A
	Number of insulation layers (pcs) .....		N/A
2.10.7	Component external terminations		N/A
2.10.8	Tests on coated printed boards and coated components		N/A
2.10.8.1	Sample preparation and preliminary inspection		N/A
2.10.8.2	Thermal conditioning		N/A
2.10.8.3	Electric strength test		N/A
2.10.8.4	Abrasion resistance test		N/A
2.10.9	Thermal cycling		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
2.10.10	Test for Pollution Degree 1 environment and insulating compound		N/A
2.10.11	Tests for semiconductor devices and cemented joints		N/A
2.10.12	Enclosed and sealed parts		N/A
<b>3</b>	<b>WIRING, CONNECTIONS AND SUPPLY</b>		P
<b>3.1</b>	<b>General</b>		P
3.1.1	Current rating and overcurrent protection	Suitable wire used, also see table 1.5.1	P
3.1.2	Protection against mechanical damage		N/A
3.1.3	Securing of internal wiring		N/A
3.1.4	Insulation of conductors		N/A
3.1.5	Beads and ceramic insulators		N/A
3.1.6	Screws for electrical contact pressure		N/A
3.1.7	Insulating materials in electrical connections		N/A
3.1.8	Self-tapping and spaced thread screws		N/A
3.1.9	Termination of conductors		N/A
	10 N pull test		N/A
3.1.10	Sleeving on wiring		N/A
<b>3.2</b>	<b>Connection to a mains supply</b>	<i>Not connected to a mains supply</i>	N/A
3.2.1	Means of connection		N/A
3.2.1.1	Connection to an a.c. mains supply		N/A
3.2.1.2	Connection to a d.c. mains supply		N/A
3.2.2	Multiple supply connections		N/A
3.2.3	Permanently connected equipment		N/A
	Number of conductors, diameter of cable and conduits (mm) .....		—
3.2.4	Appliance inlets		N/A
3.2.5	Power supply cords		N/A
3.2.5.1	AC power supply cords		N/A
	Type .....		—
	Rated current (A), cross-sectional area (mm <sup>2</sup> ), AWG .....		—

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Clause	Requirement + Test	Result - Remark	Verdict
3.2.5.2	DC power supply cords		N/A
3.2.6	Cord anchorages and strain relief		N/A
	Mass of equipment (kg), pull (N) ..... :		—
	Longitudinal displacement (mm) ..... :		—
3.2.7	Protection against mechanical damage		N/A
3.2.8	Cord guards		N/A
	Diameter or minor dimension D (mm); test mass (g) ..... :		—
	Radius of curvature of cord (mm) ..... :		—
3.2.9	Supply wiring space		N/A
<b>3.3</b>	<b>Wiring terminals for connection of external conductors</b> <i>Class III equipment, not connected to a mains supply</i>		N/A
3.3.1	Wiring terminals		N/A
3.3.2	Connection of non-detachable power supply cords		N/A
3.3.3	Screw terminals		N/A
3.3.4	Conductor sizes to be connected		N/A
	Rated current (A), cord/cable type, cross-sectional area (mm <sup>2</sup> ) ..... :		—
3.3.5	Wiring terminal sizes		N/A
	Rated current (A), type, nominal thread diameter (mm) ..... :		—
3.3.6	Wiring terminal design		N/A
3.3.7	Grouping of wiring terminals		N/A
3.3.8	Stranded wire		N/A
<b>3.4</b>	<b>Disconnection from the mains supply</b> <i>Class III equipment, not connected to a mains supply</i>		N/A
3.4.1	General requirement		N/A
3.4.2	Disconnect devices		N/A
3.4.3	Permanently connected equipment		N/A
3.4.4	Parts which remain energized		N/A
3.4.5	Switches in flexible cords		N/A
3.4.6	Number of poles - single-phase and d.c. equipment		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
3.4.7	Number of poles - three-phase equipment		N/A
3.4.8	Switches as disconnect devices		N/A
3.4.9	Plugs as disconnect devices		N/A
3.4.10	Interconnected equipment		N/A
3.4.11	Multiple power sources		N/A
<b>3.5</b>	<b>Interconnection of equipment</b>		P
3.5.1	General requirements		P
3.5.2	Types of interconnection circuits ..... :	SELV to SELV	P
3.5.3	ELV circuits as interconnection circuits	No ELV interconnection	N/A
3.5.4	Data ports for additional equipment	No data ports	N/A
<b>4</b>	<b>PHYSICAL REQUIREMENTS</b>		N/A
<b>4.1</b>	<b>Stability</b>		N/A
	<i>Built-in equipment, should be evaluated during final installation.</i>		
	Angle of 10°		N/A
	Test force (N) ..... :		N/A
<b>4.2</b>	<b>Mechanical strength</b>		N/A
	<i>Built-in equipment, should be evaluated during final installation.</i>		
4.2.1	General		N/A
	Rack-mounted equipment.		N/A
4.2.2	Steady force test, 10 N		N/A
4.2.3	Steady force test, 30 N		N/A
4.2.4	Steady force test, 250 N		N/A
4.2.5	Impact test		N/A
	Fall test		N/A
	Swing test		N/A
4.2.6	Drop test; height (mm) ..... :		N/A
4.2.7	Stress relief test		N/A
4.2.8	Cathode ray tubes		N/A
	Picture tube separately certified ..... :		N/A
4.2.9	High pressure lamps		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
4.2.10	Wall or ceiling mounted equipment; force (N) ..... :	Not wall or ceiling mounted equipment	N/A
<b>4.3</b>	<b>Design and construction</b>		P
4.3.1	Edges and corners	Edges and corners of the enclosure are rounded	P
4.3.2	Handles and manual controls; force (N).....:	No handles or controls provided	N/A
4.3.3	Adjustable controls	No such controls provided	N/A
4.3.4	Securing of parts	Wire fixed in position	P
4.3.5	Connection by plugs and sockets	No such connection	N/A
4.3.6	Direct plug-in equipment	Not direct plug-in equipment	N/A
	Torque .....		—
	Compliance with the relevant mains plug standard .....		N/A
4.3.7	Heating elements in earthed equipment	No heating element	N/A
4.3.8	Batteries	Battery and cell comply with UL 2054 and UL 1642	P
	- Overcharging of a rechargeable battery	(see appended tables 4.3.8 and 5.3)	P
	- Unintentional charging of a non-rechargeable battery	Rechargeable battery	N/A
	- Reverse charging of a rechargeable battery		N/A
	- Excessive discharging rate for any battery	(see appended tables 4.3.8 and 5.3)	P
4.3.9	Oil and grease	No oil or grease	N/A
4.3.10	Dust, powders, liquids and gases	Equipment in intended use not considered to be exposed to these	N/A
4.3.11	Containers for liquids or gases	No container for liquid or gas	N/A
4.3.12	Flammable liquids .....	No flammable liquid	N/A
	Quantity of liquid (l) .....		N/A
	Flash point (°C) .....		N/A
4.3.13	Radiation		N/A
4.3.13.1	General		N/A
4.3.13.2	Ionizing radiation		N/A
	Measured radiation (pA/kg) .....		—
	Measured high-voltage (kV) .....		—

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Clause	Requirement + Test	Result - Remark	Verdict
	Measured focus voltage (kV) .....		—
	CRT markings .....		—
4.3.13.3	Effect of ultraviolet (UV) radiation on materials		N/A
	Part, property, retention after test, flammability classification .....		N/A
4.3.13.4	Human exposure to ultraviolet (UV) radiation .....		N/A
4.3.13.5	Lasers (including laser diodes) and LEDs	No laser or LEDs	N/A
4.3.13.5.1	Lasers (including laser diodes)		N/A
	Laser class .....		—
4.3.13.5.2	Light emitting diodes (LEDs)		N/A
4.3.13.6	Other types .....		N/A
<b>4.4</b>	<b>Protection against hazardous moving parts</b>		N/A
4.4.1	General	No such moving parts	N/A
4.4.2	Protection in operator access areas .....		N/A
	Household and home/office document/media shredders		N/A
4.4.3	Protection in restricted access locations .....		N/A
4.4.4	Protection in service access areas		N/A
4.4.5	Protection against moving fan blades		N/A
4.4.5.1	General		N/A
	Not considered to cause pain or injury. a) .....		N/A
	Is considered to cause pain, not injury. b) .....		N/A
	Considered to cause injury. c) .....		N/A
4.4.5.2	Protection for users		N/A
	Use of symbol or warning .....		N/A
4.4.5.3	Protection for service persons		N/A
	Use of symbol or warning .....		N/A
<b>4.5</b>	<b>Thermal requirements</b>		P
4.5.1	General		P
4.5.2	Temperature tests		P
	Normal load condition per Annex L .....	Equipment loaded with rated load	—

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Clause	Requirement + Test	Result - Remark	Verdict
4.5.3	Temperature limits for materials	(see appended table 4.5)	P
4.5.4	Touch temperature limits	(see appended table 4.5)	P
4.5.5	Resistance to abnormal heat .....	No hazardous voltage existing within the equipment	N/A

<b>4.6</b>	<b>Openings in enclosures</b> <i>Built-in equipment, should be evaluated during final installation.</i>		N/A
4.6.1	Top and side openings		N/A
	Dimensions (mm) .....		—
4.6.2	Bottoms of fire enclosures		N/A
	Construction of the bottom, dimensions (mm) .. :		—
4.6.3	Doors or covers in fire enclosures		N/A
4.6.4	Openings in transportable equipment		N/A
4.6.4.1	Constructional design measures		N/A
	Dimensions (mm) .....		—
4.6.4.2	Evaluation measures for larger openings		N/A
4.6.4.3	Use of metallized parts		N/A
4.6.5	Adhesives for constructional purposes		N/A
	Conditioning temperature (°C), time (weeks) .....		—

<b>4.7</b>	<b>Resistance to fire</b>		P
4.7.1	Reducing the risk of ignition and spread of flame	No excessive temperatures. No easily burning materials employed. Safety relevant components used within their specified temperature limits	P
	Method 1, selection and application of components wiring and materials		P
	Method 2, application of all of simulated fault condition tests		N/A
4.7.2	Conditions for a fire enclosure	Fire enclosure for the cell is not required. Other parts may require a fire enclosure which should be provided in the final system assembly.	P
4.7.2.1	Parts requiring a fire enclosure		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
4.7.2.2	Parts not requiring a fire enclosure	Short circuit test performed on the external terminals of the component cell during UL 1642 evaluation, there was no flame observed during that test.	P
4.7.3	Materials		P
4.7.3.1	General	PCB with V-0	P
4.7.3.2	Materials for fire enclosures		N/A
4.7.3.3	Materials for components and other parts outside fire enclosures		N/A
4.7.3.4	Materials for components and other parts inside fire enclosures	Internal parts are at least V-0 except small components.	P
4.7.3.5	Materials for air filter assemblies	No filter assemblies	N/A
4.7.3.6	Materials used in high-voltage components	No high-voltage components	N/A

<b>5</b>	<b>ELECTRICAL REQUIREMENTS AND SIMULATED ABNORMAL CONDITIONS</b>		P
<b>5.1</b>	<b>Touch current and protective conductor current</b> <i>Class III equipment, no voltage higher than SELV within the equipment</i>		N/A
5.1.1	General		N/A
5.1.2	Configuration of equipment under test (EUT)		N/A
5.1.2.1	Single connection to an a.c. mains supply		N/A
5.1.2.2	Redundant multiple connections to an a.c. mains supply		N/A
5.1.2.3	Simultaneous multiple connections to an a.c. mains supply		N/A
5.1.3	Test circuit		N/A
5.1.4	Application of measuring instrument		N/A
5.1.5	Test procedure		N/A
5.1.6	Test measurements		N/A
	Supply voltage (V) .....		—
	Measured touch current (mA) .....		—
	Max. allowed touch current (mA) .....		—
	Measured protective conductor current (mA) .....		—
	Max. allowed protective conductor current (mA) ...:		—
5.1.7	Equipment with touch current exceeding 3,5 mA		N/A

<b>IEC 60950-1</b>			
Clause	Requirement + Test	Result - Remark	Verdict
5.1.7.1	General .....		N/A
5.1.7.2	Simultaneous multiple connections to the supply		N/A
5.1.8	Touch currents to telecommunication networks and cable distribution systems and from telecommunication networks	No TNV circuits	N/A
5.1.8.1	Limitation of the touch current to a telecommunication network or to a cable distribution system		N/A
	Supply voltage (V) .....		—
	Measured touch current (mA) .....		—
	Max. allowed touch current (mA) .....		—
5.1.8.2	Summation of touch currents from telecommunication networks		N/A
	a) EUT with earthed telecommunication ports .....		N/A
	b) EUT whose telecommunication ports have no reference to protective earth		N/A
<b>5.2</b>	<b>Electric strength</b>		N/A
5.2.1	General	Class III product	N/A
5.2.2	Test procedure		N/A
<b>5.3</b>	<b>Abnormal operating and fault conditions</b>		P
5.3.1	Protection against overload and abnormal operation	(see appended table 5.3)	P
5.3.2	Motors	No motors	N/A
5.3.3	Transformers	No transformers	N/A
5.3.4	Functional insulation .....	By short-circuited, results see appended table 5.3	P
5.3.5	Electromechanical components	No electromechanical component	N/A
5.3.6	Audio amplifiers in ITE .....	No amplifiers	N/A
5.3.7	Simulation of faults	(see appended table 5.3)	P
5.3.8	Unattended equipment	No such equipment	N/A
5.3.9	Compliance criteria for abnormal operating and fault conditions		P

<b>IEC 60950-1</b>			
Clause	Requirement + Test	Result - Remark	Verdict
5.3.9.1	During the tests	No fire or molten metal occurred and no deformation of enclosure during the tests	P
5.3.9.2	After the tests	Functional insulation only	N/A
<b>6</b>	<b>CONNECTION TO TELECOMMUNICATION NETWORKS</b>		N/A
<b>6.1</b>	<b>Protection of telecommunication network service persons, and users of other equipment connected to the network, from hazards in the equipment</b>		N/A
6.1.1	Protection from hazardous voltages		N/A
6.1.2	Separation of the telecommunication network from earth		N/A
6.1.2.1	Requirements		N/A
	Supply voltage (V) .....		—
	Current in the test circuit (mA) .....		—
6.1.2.2	Exclusions .....		N/A
<b>6.2</b>	<b>Protection of equipment users from overvoltages on telecommunication networks</b>		N/A
6.2.1	Separation requirements		N/A
6.2.2	Electric strength test procedure		N/A
6.2.2.1	Impulse test		N/A
6.2.2.2	Steady-state test		N/A
6.2.2.3	Compliance criteria		N/A
<b>6.3</b>	<b>Protection of the telecommunication wiring system from overheating</b>		N/A
	Max. output current (A) .....		—
	Current limiting method .....		—
<b>7</b>	<b>CONNECTION TO CABLE DISTRIBUTION SYSTEMS</b>		N/A
<b>7.1</b>	<b>General</b>		N/A
7.2	Protection of cable distribution system service persons, and users of other equipment connected to the system, from hazardous voltages in the equipment		N/A
7.3	Protection of equipment users from overvoltages on the cable distribution system		N/A

<b>IEC 60950-1</b>			
Clause	Requirement + Test	Result - Remark	Verdict
7.4	Insulation between primary circuits and cable distribution systems		N/A
7.4.1	General		N/A
7.4.2	Voltage surge test		N/A
7.4.3	Impulse test		N/A
<b>A</b>	<b>ANNEX A, TESTS FOR RESISTANCE TO HEAT AND FIRE</b>		N/A
<b>A.1</b>	<b>Flammability test for fire enclosures of movable equipment having a total mass exceeding 18 kg, and of stationary equipment (see 4.7.3.2)</b>		N/A
A.1.1	Samples .....		—
	Wall thickness (mm) .....		—
A.1.2	Conditioning of samples; temperature (°C) .....		N/A
A.1.3	Mounting of samples .....		N/A
A.1.4	Test flame (see IEC 60695-11-3)		N/A
	Flame A, B, C or D .....		—
A.1.5	Test procedure		N/A
A.1.6	Compliance criteria		N/A
	Sample 1 burning time (s) .....		—
	Sample 2 burning time (s) .....		—
	Sample 3 burning time (s) .....		—
<b>A.2</b>	<b>Flammability test for fire enclosures of movable equipment having a total mass not exceeding 18 kg, and for material and components located inside fire enclosures (see 4.7.3.2 and 4.7.3.4)</b>		N/A
A.2.1	Samples, material .....		—
	Wall thickness (mm) .....		—
A.2.2	Conditioning of samples; temperature (°C) .....		N/A
A.2.3	Mounting of samples .....		N/A
A.2.4	Test flame (see IEC 60695-11-4)		N/A
	Flame A, B or C .....		—
A.2.5	Test procedure		N/A
A.2.6	Compliance criteria		N/A
	Sample 1 burning time (s) .....		—
	Sample 2 burning time (s) .....		—



<b>IEC 60950-1</b>			
Clause	Requirement + Test	Result - Remark	Verdict
	Sample 3 burning time (s) .....		—
A.2.7	Alternative test acc. to IEC 60695-11-5, cl. 5 and 9		N/A
	Sample 1 burning time (s) .....		—
	Sample 2 burning time (s) .....		—
	Sample 3 burning time (s) .....		—
<b>A.3</b>	<b>Hot flaming oil test (see 4.6.2)</b>		N/A
A.3.1	Mounting of samples		N/A
A.3.2	Test procedure		N/A
A.3.3	Compliance criterion		N/A
<b>B</b>	<b>ANNEX B, MOTOR TESTS UNDER ABNORMAL CONDITIONS (see 4.7.2.2 and 5.3.2)</b>		N/A
<b>B.1</b>	<b>General requirements</b>		N/A
	Position .....		—
	Manufacturer .....		—
	Type .....		—
	Rated values .....		—
<b>B.2</b>	<b>Test conditions</b>		N/A
<b>B.3</b>	<b>Maximum temperatures</b>		N/A
<b>B.4</b>	<b>Running overload test</b>		N/A
<b>B.5</b>	<b>Locked-rotor overload test</b>		N/A
	Test duration (days) .....		—
	Electric strength test: test voltage (V) .....		—
<b>B.6</b>	<b>Running overload test for d.c. motors in secondary circuits</b>		N/A
B.6.1	General		N/A
B.6.2	Test procedure		N/A
B.6.3	Alternative test procedure		N/A
B.6.4	Electric strength test; test voltage (V) .....		N/A
<b>B.7</b>	<b>Locked-rotor overload test for d.c. motors in secondary circuits</b>		N/A
B.7.1	General		N/A
B.7.2	Test procedure		N/A
B.7.3	Alternative test procedure		N/A

<b>IEC 60950-1</b>			
Clause	Requirement + Test	Result - Remark	Verdict
B.7.4	Electric strength test; test voltage (V) .....		N/A
<b>B.8</b>	<b>Test for motors with capacitors</b>		N/A
<b>B.9</b>	<b>Test for three-phase motors</b>		N/A
<b>B.10</b>	<b>Test for series motors</b>		N/A
	Operating voltage (V) .....		—
<b>C</b>	<b>ANNEX C, TRANSFORMERS (see 1.5.4 and 5.3.3)</b>		N/A
	Position .....		—
	Manufacturer .....		—
	Type .....		—
	Rated values .....		—
	Method of protection.....		—
<b>C.1</b>	<b>Overload test</b>		N/A
<b>C.2</b>	<b>Insulation</b>		N/A
	Protection from displacement of windings.....		N/A
<b>D</b>	<b>ANNEX D, MEASURING INSTRUMENTS FOR TOUCH-CURRENT TESTS (see 5.1.4)</b>		N/A
<b>D.1</b>	<b>Measuring instrument</b>		N/A
<b>D.2</b>	<b>Alternative measuring instrument</b>		N/A
<b>E</b>	<b>ANNEX E, TEMPERATURE RISE OF A WINDING (see 1.4.13)</b>		N/A
<b>F</b>	<b>ANNEX F, MEASUREMENT OF CLEARANCES AND CREEPAGE DISTANCES (see 2.10 and Annex G)</b>		N/A
<b>G</b>	<b>ANNEX G, ALTERNATIVE METHOD FOR DETERMINING MINIMUM CLEARANCES</b>		N/A
<b>G.1</b>	<b>Clearances</b>		N/A
G.1.1	General		N/A
G.1.2	Summary of the procedure for determining minimum clearances		N/A
<b>G.2</b>	<b>Determination of mains transient voltage (V)</b>		N/A
G.2.1	AC mains supply .....		N/A

<b>IEC 60950-1</b>			
Clause	Requirement + Test	Result - Remark	Verdict
G.2.2	Earthed d.c. mains supplies .....		N/A
G.2.3	Unearthed d.c. mains supplies .....		N/A
G.2.4	Battery operation .....		N/A
<b>G.3</b>	<b>Determination of telecommunication network transient voltage (V) .....</b>		N/A
<b>G.4</b>	<b>Determination of required withstand voltage (V)</b>		N/A
G.4.1	Mains transients and internal repetitive peaks .....		N/A
G.4.2	Transients from telecommunication networks .....		N/A
G.4.3	Combination of transients		N/A
G.4.4	Transients from cable distribution systems		N/A
<b>G.5</b>	<b>Measurement of transient voltages (V)</b>		N/A
	a) Transients from a mains supply		N/A
	For an a.c. mains supply		N/A
	For a d.c. mains supply		N/A
	b) Transients from a telecommunication network		N/A
<b>G.6</b>	<b>Determination of minimum clearances .....</b>		N/A
<b>H</b>	<b>ANNEX H, IONIZING RADIATION (see 4.3.13)</b>		N/A
<b>J</b>	<b>ANNEX J, TABLE OF ELECTROCHEMICAL POTENTIALS (see 2.6.5.6)</b>		N/A
	Metal(s) used .....		—
<b>K</b>	<b>ANNEX K, THERMAL CONTROLS (see 1.5.3 and 5.3.8)</b>		N/A
K.1	Making and breaking capacity		N/A
K.2	Thermostat reliability; operating voltage (V) .....		N/A
K.3	Thermostat endurance test; operating voltage (V) .....		N/A
K.4	Temperature limiter endurance; operating voltage (V) .....		N/A
K.5	Thermal cut-out reliability		N/A
K.6	Stability of operation	(see appended table 5.3)	N/A
<b>L</b>	<b>ANNEX L, NORMAL LOAD CONDITIONS FOR SOME TYPES OF ELECTRICAL BUSINESS EQUIPMENT (see 1.2.2.1 and 4.5.2)</b>		P
L.1	Typewriters		N/A

<b>IEC 60950-1</b>			
Clause	Requirement + Test	Result - Remark	Verdict
L.2	Adding machines and cash registers		N/A
L.3	Erasers		N/A
L.4	Pencil sharpeners		N/A
L.5	Duplicators and copy machines		N/A
L.6	Motor-operated files		N/A
L.7	Other business equipment	Rechargeable Lithium-ion Battery and discharging battery at manufacturer specified current with battery charged to 4.2V	P

<b>M</b>	<b>ANNEX M, CRITERIA FOR TELEPHONE RINGING SIGNALS (see 2.3.1)</b>		N/A
M.1	Introduction		N/A
M.2	Method A		N/A
M.3	Method B		N/A
M.3.1	Ringling signal		N/A
M.3.1.1	Frequency (Hz) .....		—
M.3.1.2	Voltage (V) .....		—
M.3.1.3	Cadence; time (s), voltage (V) .....		—
M.3.1.4	Single fault current (mA) .....		—
M.3.2	Tripping device and monitoring voltage .....		N/A
M.3.2.1	Conditions for use of a tripping device or a monitoring voltage		N/A
M.3.2.2	Tripping device		N/A
M.3.2.3	Monitoring voltage (V) .....		N/A

<b>N</b>	<b>ANNEX N, IMPULSE TEST GENERATORS (see 1.5.7.2, 1.5.7.3, 2.10.3.9, 6.2.2.1, 7.3.2, 7.4.3 and Clause G.5)</b>		N/A
N.1	ITU-T impulse test generators		N/A
N.2	IEC 60065 impulse test generator		N/A

<b>P</b>	<b>ANNEX P, NORMATIVE REFERENCES</b>		—
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<b>Q</b>	<b>ANNEX Q, Voltage dependent resistors (VDRs) (see 1.5.9.1)</b>		N/A
	- Preferred climatic categories .....		N/A

<b>IEC 60950-1</b>			
Clause	Requirement + Test	Result - Remark	Verdict
	- Maximum continuous voltage .....		N/A
	- Combination pulse current .....		N/A
	Body of the VDR Test according to IEC60695-11-5 .....		N/A
	Body of the VDR. Flammability class of material ( min V-1) .....		N/A
<b>R</b>	<b>ANNEX R, EXAMPLES OF REQUIREMENTS FOR QUALITY CONTROL PROGRAMMES</b>		N/A
R.1	Minimum separation distances for unpopulated coated printed boards (see 2.10.6.2)		N/A
R.2	Reduced clearances (see 2.10.3)		N/A
<b>S</b>	<b>ANNEX S, PROCEDURE FOR IMPULSE TESTING (see 6.2.2.3)</b>		N/A
S.1	Test equipment		N/A
S.2	Test procedure		N/A
S.3	Examples of waveforms during impulse testing		N/A
<b>T</b>	<b>ANNEX T, GUIDANCE ON PROTECTION AGAINST INGRESS OF WATER (see 1.1.2)</b>		N/A
			—
<b>U</b>	<b>ANNEX U, INSULATED WINDING WIRES FOR USE WITHOUT INTERLEAVED INSULATION (see 2.10.5.4)</b>		N/A
			—
<b>V</b>	<b>ANNEX V, AC POWER DISTRIBUTION SYSTEMS (see 1.6.1)</b>		N/A
V.1	Introduction		N/A
V.2	TN power distribution systems		N/A
<b>W</b>	<b>ANNEX W, SUMMATION OF TOUCH CURRENTS</b>		N/A
W.1	Touch current from electronic circuits		N/A
W.1.1	Floating circuits		N/A
W.1.2	Earthed circuits		N/A
W.2	Interconnection of several equipments		N/A
W.2.1	Isolation		N/A

<b>IEC 60950-1</b>			
<b>Clause</b>	<b>Requirement + Test</b>	<b>Result - Remark</b>	<b>Verdict</b>
W.2.2	Common return, isolated from earth		N/A
W.2.3	Common return, connected to protective earth		N/A
<b>X</b>	<b>ANNEX X, MAXIMUM HEATING EFFECT IN TRANSFORMER TESTS (see clause C.1)</b>		N/A
X.1	Determination of maximum input current		N/A
X.2	Overload test procedure		N/A
<b>Y</b>	<b>ANNEX Y, ULTRAVIOLET LIGHT CONDITIONING TEST (see 4.3.13.3)</b>		N/A
Y.1	Test apparatus .....		N/A
Y.2	Mounting of test samples .....		N/A
Y.3	Carbon-arc light-exposure apparatus .....		N/A
Y.4	Xenon-arc light exposure apparatus .....		N/A
<b>Z</b>	<b>ANNEX Z, OVERVOLTAGE CATEGORIES (see 2.10.3.2 and Clause G.2)</b>		N/A
<b>AA</b>	<b>ANNEX AA, MANDREL TEST (see 2.10.5.8)</b>		N/A
<b>BB</b>	<b>ANNEX BB, CHANGES IN THE SECOND EDITION</b>		—
<b>CC</b>	<b>ANNEX CC, Evaluation of integrated circuit (IC) current limiters</b>		N/A
CC.1	General		N/A
CC.2	Test program 1 .....		N/A
CC.3	Test program 2 .....		N/A
CC.4	Test program 3 .....		N/A
CC.5	Compliance .....		N/A
<b>DD</b>	<b>ANNEX DD, Requirements for the mounting means of rack-mounted equipment</b>		N/A
DD.1	General		N/A
DD.2	Mechanical strength test, variable N.....		N/A
DD.3	Mechanical strength test, 250 N, including end stops.....		N/A
DD.4	Compliance.....		N/A

<b>IEC 60950-1</b>			
<b>Clause</b>	<b>Requirement + Test</b>	<b>Result - Remark</b>	<b>Verdict</b>
<b>EE</b>	<b>ANNEX EE, Household and home/office document/media shredders</b>		N/A
EE.1	General		N/A
EE.2	Markings and instructions		N/A
	Use of markings or symbols.....:		N/A
	Information of user instructions, maintenance and/or servicing instructions.....:		N/A
EE.3	Inadvertent reactivation test.....:		N/A
EE.4	Disconnection of power to hazardous moving parts:		N/A
	Use of markings or symbols.....:		N/A
EE.5	Protection against hazardous moving parts		N/A
	Test with test finger (Figure 2A) .....		N/A
	Test with wedge probe (Figure EE1 and EE2) .....		N/A

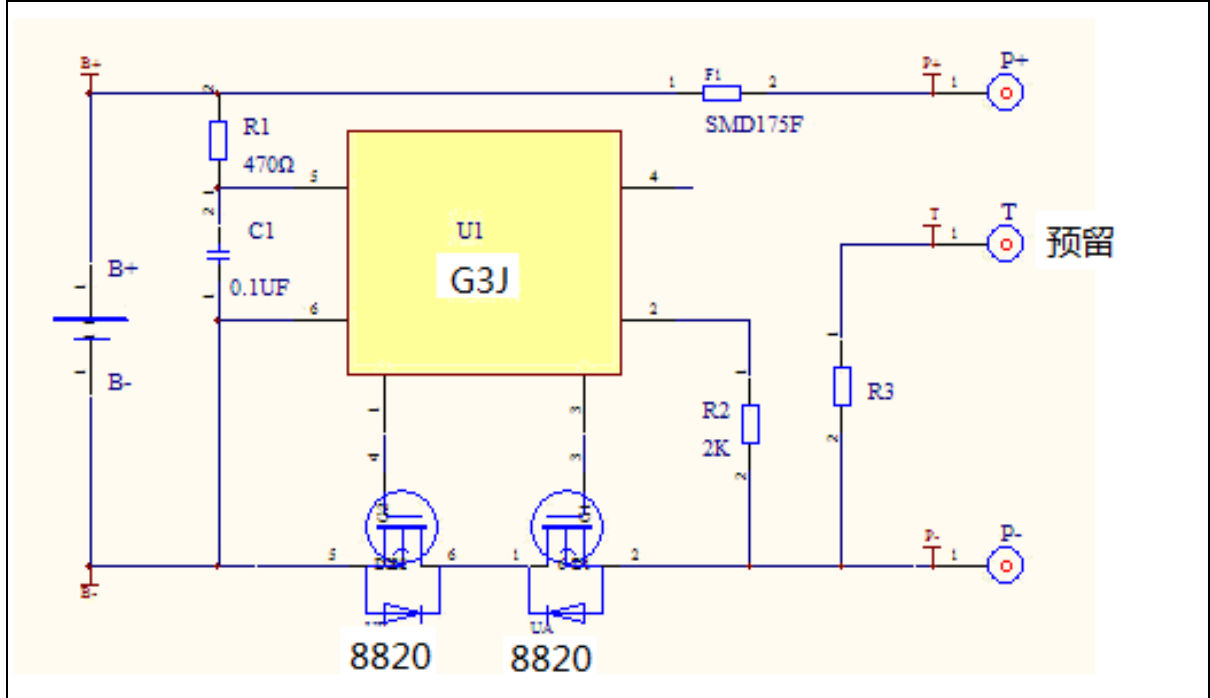
<b>1.5.1</b>	<b>TABLE: List of critical components</b>					P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity <sup>1)</sup>	
<b>See UL 2054 Report</b>						

<b>2.5</b>	<b>TABLE: limited power source measurement</b>					P
<p>- The output of the AC adaptor is isolated from mains with an isolation transformer.</p> <p>- A regulating network limits the output in compliance with Table 2B, both under normal operating conditions and after any single fault in the regulating network (open-circuit or short-circuit)</p>						
According to Table 2B/2C (under normal load condition)						
Output Voltage (Voc)			Output Current (Isc)		VA	
V ac	V dc	Measured	Max Allowed	Measured	Max Allowed	Measured
<30	<30	4.17	<8A	2.1	<100	7.6
Sample No.						
According to Table 2B/2C (under U2 Pin5-Pin2 S-C) short condition)						
Output Voltage (Voc)			Output Current (Isc)		VA	
V ac	V dc	Measured	Max Allowed	Measured	Max Allowed	Measured
<30	<30	4.17	<8A	2.0	<100	7.4
Sample No.						
According to Table 2B/2C (under F1 S-C) short condition)						
Output Voltage (Voc)			Output Current (Isc)		VA	
V ac	V dc	Measured	Max Allowed	Measured	Max Allowed	Measured
<30	<30	4.19	<8A	3.2	<100	10.4
Sample No.						
According to Table 2B/2C (R1 S-C) short condition)						
Output Voltage (Voc)			Output Current (Isc)		VA	
V ac	V dc	Measured	Max Allowed	Measured	Max Allowed	Measured
<30	<30	4.18	<8A	1.3	<100	6.5
Sample No.						



4.3.8	TABLE: Batteries								P
The tests of 4.3.8 are applicable only when appropriate battery data is not available						Also see test in table 5.3		P	
Is it possible to install the battery in a reverse polarity position?						No (see below)		P	
	Non-rechargeable batteries			Rechargeable batteries					
	Discharging		Un-intentional charging	Charging		Discharging		Reversed charging	
	Meas. current	Manuf. Specs.		Meas. current	Manuf. Specs.	Meas. current	Manuf. Specs.	Meas. current	Manuf. Specs.
Max. current during normal condition	--	--	--	0.7	0.7	0.7	1.05	--	--
Max. current during fault condition	--	--	--	2.4*	0.7	3.0*	1.05	--	--
Test results:								Verdict	
- Chemical leaks						No chemical leaks		P	
- Explosion of the battery						No explosion		P	
- Emission of flame or expulsion of molten metal						No flame or expulsion		P	
- Electric strength tests of equipment after completion of tests								N/A	
<b>Supplementary information:</b>									
*Measured when applied Max. charging voltage of 4.2V, measured value exceeded the Max. charging current, actual Max. charging current must still be evaluated in the final system. Max. charging current measured at fault condition of MOS (U2) short circuit for the worst case as described in Table 5.3.									
**Max. discharging current must be limited by battery discharging circuit of the end product or system, and has to be evaluated in the end product or system.									

4.3.8	TABLE: Batteries								P
Battery category..... : <b>Li-ion Polymer Battery</b>									
Manufacturer .....									
Type / model..... : BL0750F5030481S1PC*C (*=A, B, C, H, J, K, L, M, N, P, Q, R, T, U, V, 1, 2, 3, 4, 5, 6, 7, 8, 9)									
Voltage .....									
Capacity..... : 700mAh									
Tested and Certified by (incl. Ref. No.) ..... : Tested throughout this report									
Circuit protection diagram:									



**MARKINGS AND INSTRUCTIONS (1.7.13)**

Location of replaceable battery	The battery pack is intended to install in a final portable equipment, appropriate marking and warning information are attached on the equipment or in the equipment instructions
Language(s) .....	
Close to the battery .....	Marking required by 1.7.1.1 and 1.7.1.2 on the battery.
In the servicing instructions .....	
In the operating instructions .....	

4.5	TABLE: Thermal requirements	P
	Supply voltage (V) .....	See below
	Ambient T <sub>min</sub> (°C) .....	--
	Ambient T <sub>max</sub> (°C) .....	--
	Maximum measured temperature T of part/at:	T (°C) Allowed T <sub>max</sub> (°C)
Discharging (fully charged battery discharge with 2.1A to endpoint voltage 3.0V)		
	Lead Wiring	27.3 80-45+23.8=58.8
	Fuse	55.8 For reference
	PCB	46.7 130-45+23.8=108.8
	Cell body	28.1 For reference
	Surface	28.1 For reference

Ambient									23.8	--
Charging (fully discharged battery charge with 2.4A)										
Lead Wiring									27.5	80-60+22.4=42.4
Fuse									45.7	For reference
PCB									49.7	130-60+22.4=92.4
Cell body									37.6	For reference
Surface									37.6	For reference
Ambient									22.4	--
Supplementary information:										
Temperature T of winding:	t <sub>1</sub> (°C)	R <sub>1</sub> (Ω)	t <sub>2</sub> (°C)	R <sub>2</sub> (Ω)	T (°C)	Allowed T <sub>max</sub> (°C)	Insulation class			
--										
Supplementary information: Above test data derived from UL 2054 report table 13A/13B.										

5.3							P
TABLE: Fault condition tests							
Ambient temperature (°C) .....						See below	—
Power source for EUT: Manufacturer, model/type, output rating .....						--	—
Component No.	Fault	Supply voltage (V)	Test time	Fuse #	Current (A)	Observation	
Charge condition (with battery already discharged to 3.0V)							
U2 (pin 2-5)	S-C	4.2	7.0h	--	0.7(normal) to 2.4 (fault)	No chemicals leak, explosion, molten metal emission or expulsion observed.	
F1	S-C	4.2	7.0h	--	0.7(normal) to 2.3 (fault)	Unit cannot work normally, Current decreased from 1.0A to 0A immediately with C12 short-circuit. Recoverable. No chemicals leak, explosion, molten metal emission or expulsion observed	
R2	S-C	4.2	7.0h	--	0.7 (normal) to 1.8(fault)	No chemicals leak, explosion, molten metal emission or expulsion observed.	
Discharge condition(with battery already fully charged to 4.2V)							
U2 (pin 2-5)	S-C	4.2	7.0h	--	0.7(normal) to 2.1 (fault)	No chemicals leak, explosion, molten metal emission or expulsion observed.	
F1	S-C	4.2	7.0h	--	0.7(normal) to 3.0 (fault)	Unit work normally, After 4mins unit shutdown, Recoverable. No chemicals leak, explosion, molten metal emission or expulsion observed	
R2	S-C	4.2	7.0h	--	0.7 (normal) to 1.4(fault)	No chemicals leak, explosion, molten metal emission or expulsion observed.	
Supplementary information: SC=Short circuit, BO=Break off							

UL 60950_1F ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

<b>ATTACHMENT TO TEST REPORT UL 60950-1 with A1:2009 and A2:2013</b> <b>CANADA NATIONAL DIFFERENCES</b> Information technology equipment – Safety – Part 1: General requirements			
<b>Differences according to</b> .....: CAN/CSA-C22.2 No. 60950-1-07, Amd 1:2011, Amd 2:2014			
<b>Attachment Form No.</b> ....: CA_ND_UL 60950_1F			
<b>Attachment Originator</b> .....: CSA			
<b>Master Attachment</b> .....: Date (2015-05)			
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1.1.1	All equipment is to be designed to allow installation in accordance with the National Electrical Code (NEC), ANSI/NFPA 70, the Canadian Electrical Code (CEC), Part I, CAN/CSA C22.1, and when applicable, the National Electrical Safety Code, IEEE C2. Also, unless marked or otherwise identified, installation is allowed per the Standard for the Protection of Electronic Computer/Data-Processing Equipment, ANSI/NFPA 75.		P
1.1.2	Baby monitors are required to additionally comply with ASTM F2951, Consumer Safety Specification for Baby Monitors.		N/A
1.4.14	For Pluggable Equipment Type A, the protection in the installation is assumed to be 20A:		N/A
1.5.5	For lengths exceeding 3.05 m, external interconnecting flexible cord and cable assemblies are required to be a suitable cable type (e.g., DP, CL2) specified in the CEC/NEC.  For lengths 3.05 m or less, external interconnecting flexible cord and cable assemblies that are not types specified in the CEC/NEC are required to have special construction features and identification markings.		N/A

UL 60950_1F ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
1.7.1	Equipment for use on a.c. mains supply systems with a neutral and more than one phase conductor (e.g. 120/240 V, 3-wire) require a special marking format for electrical ratings. A voltage rating that exceeds an attachment plug cap rating is only permitted if it does not exceed the extreme operating conditions in Table 2 of CAN/CSA C22.2 No. 235, and if it is part of a range that extends into the Table 2 "Normal Operating Conditions." Likewise, a voltage rating shall not be lower than the specified "Normal Operating Conditions," unless it is part of a range that extends into the "Normal Operating Conditions."		N/A
1.7.7	Wiring terminals intended to supply Class 2 outputs in accordance with CEC Part 1 or NEC shall be marked with the voltage rating and "Class 2" or equivalent. Marking shall be located adjacent to the terminals and shall be visible during wiring.		N/A
2.5	Where a fuse is used to provide Class 2, Limited Power Source, or TNV current limiting, it shall not be operator-accessible unless it is not interchangeable.		N/A
2.6	Equipment with isolated ground (earthing) receptacles are required to comply with NEC 250.146(D) and CEC 10-112 and 10-906(8).		N/A
2.7.1	Suitable NEC/CEC branch circuit protection rated at the maximum circuit rating is required for all standard supply outlets and receptacles (such as supplied in power distribution units) if the supply branch circuit protection is not suitable.  Power distribution transformers distributing power at 100 volts or more, and rated 10 kVA or more, require special transformer overcurrent protection.		N/A
3.2	Wiring methods (terminals, leads, etc.) used for the connection of the equipment to the mains shall be in accordance with the NEC/CEC.		N/A
3.2.1	Power supply cords are required to have attachment plugs rated not less than 125 percent of the rated current of the equipment.		N/A
3.2.1.2	Equipment connected to a centralized d.c. power system, and having one pole of the DC mains input terminal connected to the main protective earthing terminal in the equipment, is required to comply with special earthing, wiring, marking and installation instruction requirements.		N/A

UL 60950_1F ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
3.2.3	Permanent connection of equipment to the mains supply by a power supply cord is not permitted, except for certain equipment, such as ATMs.		N/A
3.2.5	Power supply cords are required to be no longer than 4.5 m in length.  Minimum cord length is required to be 1.5 m, with certain constructions such as external power supplies allowed to consider both input and output cord lengths into the requirement.  Flexible power supply cords are required to be compatible with Article 400 of the NEC, and Tables 11 and 12 of the CEC.		N/A
3.2.9	Permanently connected equipment is required to have a suitable wiring compartment and wire bending space.		N/A
3.3	Wiring terminals and associated spacings for field wiring connections shall comply with CSA C22.2 No. 0		N/A
3.3.3	Wire binding screws are not permitted to attach conductors larger than 10 AWG (5.3 mm <sup>2</sup> ).		N/A
3.3.4	Terminals for permanent wiring, including protective earthing terminals, are required to be suitable for US/Canadian wire gauge sizes, rated 125 percent of the equipment rating, and be specially marked when specified (1.7.7).		N/A
3.3.5	First column of Table 3E revised to require "Smaller of the RATED CURRENT of the equipment or the PROTECTIVE CURRENT RATING of the circuit under consideration."		N/A
3.4.2	Motor control devices are required for cord-connected equipment with a motor if the equipment is rated more than 12 A, or if the motor has a nominal voltage rating greater than 120 V, or is rated more than 1/3 hp (locked rotor current over 43 A).		N/A
3.4.8	Vertically-mounted disconnect switches and circuit breakers are required to have the "on" position indicated by the handle in the up position.		N/A
3.4.11	For computer room applications, equipment with battery systems capable of supplying 750 VA for five minutes are required to have a battery disconnect means that may be connected to the computer room remote power-off circuit.		N/A
4.3.12	The maximum quantity of flammable liquid stored in equipment is required to comply with NFPA 30.		N/A

UL 60950_1F ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
4.3.13.5.1	Equipment with lasers is required to meet the U.S. Code of Federal Regulations 21 CFR 1040 (and the Canadian Radiation Emitting Devices Act, REDR C1370).		N/A
4.7	For computer room applications, automated information storage systems with combustible media greater than 0.76 m <sup>3</sup> (27 cu ft) are required to have a provision for connection of either automatic sprinklers or a gaseous agent extinguishing system with an extended discharge.		N/A
4.7.3.1	For computer room applications, enclosures with combustible material measuring greater than 0.9 m <sup>2</sup> (10 sq ft) or a single dimension greater than 1.8 m (6 ft) are required to have a flame spread rating of 50 or less. For other applications, enclosures with the same dimensions require a flame spread rating of 200 or less.		N/A
	Non-metallic enclosures of equipment for use in spaces used for environmental air (plenums) are required to comply with UL 2043.		N/A
Annex H	Equipment that produces ionizing radiation is required to comply with the U.S. Code of Federal Regulations, 21 CFR 1020 (and the Canadian Radiation Emitting Devices Act, REDR C1370).		N/A
<b>OTHER DIFFERENCES</b>			
The following key national differences are based on requirements other than national regulatory requirements.			



UL 60950_1F ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
1.5.1	Some components and materials associated with the risk of fire, electric shock, or personal injury are required to have component or material ratings in accordance with the applicable national (Canadian and/or U.S.) component or material standard requirements. These components include: attachment plugs, battery packs (rechargeable type, used with transportable equipment), cathode ray tubes, circuit breakers, communication circuit accessories, connectors (used for current interruption of non-LPS circuits), cord sets and power supply cords, direct plug-in equipment, enclosures (outdoor), flexible cords and cables, fuses (branch circuit), fuseholders, ground-fault current interrupters, industrial control equipment, insulating tape, interconnecting cables, lampholders, limit controls, printed wiring, protectors for communications circuits, receptacles, solid state controls, supplementary protectors, switches (including interlock switches), thermal cutoffs, thermostats, (multi-layer) transformer winding wire, transient voltage surge suppressors, tubing, wire connectors, and wire and cables.	See safety component list	P
1.6.1.2	A circuit for connection to the DC Mains Supply is classified as either a SELV Circuit, TNV-2 Circuit or Hazardous Voltage Circuit depending on the maximum operating voltage of the supply. This maximum operating voltage shall include consideration of the battery charging "float voltage" associated with the intended supply system, regardless of the marked power rating of the equipment.		—
2.3.1	For TNV-2 and TNV-3 circuits with other than ringing signals and with voltages exceeding 42.4 V <sub>peak</sub> or 60 V <sub>d.c.</sub> , the maximum acceptable current through a 2000 ohm resistor (or greater) connected across the voltage source with other loads disconnected is 7.1 mA peak or 30 mA d.c. under normal operating conditions.		N/A
2.3.2.1	In the event of a single fault between TNV and SELV circuits, the limits of 2.2.3 apply to SELV Circuits and accessible conductive parts.		N/A
2.6.2	Equipment with functional earthing is required to be marked with the functional earthing symbol (IEC 60417-6092).		N/A
2.6.3.4	Protective bonding conductors of non-standard protective bonding constructions (e.g., printed circuit traces) may be subjected to the additional limited short circuit test conditions specified.		N/A

UL 60950_1F ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
4.2.8.1	Enclosures around CRTs with a face diameter of 160 mm or more are required to reduce the risk of injury due to the implosion of the CRT.		N/A
4.3.2	Equipment with handles is required to comply with special loading tests.		N/A
4.3.8	Battery packs for both portable and stationary applications are required to comply with special component requirements.		N/A
5.1.8.3	Equipment intended to receive telecommunication ringing signals is required to comply with a special touch current measurement tests.		N/A
5.3.7	Internal (e.g., card cage) SELV circuit connectors and printed wiring board connectors that are accessible to the operator and that deliver power are to be overloaded.  During abnormal operating testing, if a circuit is interrupted by the opening of a component, the test shall be repeated twice (three tests total) using new components as necessary.		N/A
6.4	Equipment intended for connection to telecommunication network outside plant cable is required to be protected against overvoltage from power line crosses in accordance with 6.4 and Annex NAC.		N/A
Annex EE	UL articulated accessibility probe (Fig EE.3) required for assessing accessibility to document/media shredders instead of the Figure 2A test finger.		N/A
M.2	Continuous ringing signals up to 16 mA only are permitted if the equipment is subjected to special installation and performance restrictions.		N/A
Annex NAD	Equipment connected to a telecommunication and cable distribution networks and supplied with an earphone intended to be held against, or in the ear is required to comply with special acoustic pressure requirements.		N/A

UL 60950_1F ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

<b>ATTACHMENT TO TEST REPORT UL 60950-1 with A1: 2009 and A2:2013</b> <b>U.S.A. NATIONAL DIFFERENCES</b> Information technology equipment – Safety – Part 1: General requirements	
<b>Differences according to .....</b>	UL 60950-1-07(Second Edition) + A1: 2011 + A2: 2014
<b>Attachment Form No.....</b>	US_ND_IEC60950_1F
<b>Attachment Originator .....</b>	UL
<b>Master Attachment.....</b>	Date 2014-07
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	<b>Special national conditions</b>		<b>P</b>
1.1.1	All equipment is designed as to allow installation in accordance with the National Electrical Code (NEC), ANSI/NFPA 70, Canadian Electrical Code (CEC), Part I, CAN/CSA C22.1, and if applicable, the National Electrical Safety Code, IEEE C2		P
	Also, unless marked or otherwise identified, installation is allowed per the Standard for the Protection of Electronic Computer/Data-Processing Equipment, ANSI/NFPA 75		P
1.1.2	Baby monitors are required to additionally comply with ASTM F2951, Consumer Safety Specification for Baby Monitors	No such product	N/A
1.4.14	For Pluggable Equipment Type A, the protection in the installation is assumed to be 20A	Not pluggable equipment type A	N/A
1.5.5	For lengths exceeding 3.05 m, external interconnecting flexible cord and cable assemblies are required to be a suitable cable type (e.g., DP, CL2) specified in the /NEC		N/A
	For lengths 3.05 m or less, external interconnecting flexible cord and cable assemblies that are not types specified in the NEC are required to have special construction features and identification markings		N/A
1.7.1	Equipment for use on a.c. mains supply systems with a neutral and more than one phase conductor (e.g. 120/240 V, 3-wire) require a special marking format for electrical ratings	Not connected to mains	N/A
	A voltage rating that exceeds an attachment plug cap rating is only permitted if it does not exceed the extreme operating conditions in Table 2 of CAN/CSA C22.2 No. 235, and	No such plug	N/A
	- if it is part of a range that extends into the Table 2 "Normal Operating Conditions"		N/A

UL 60950_1F ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	Likewise, a voltage rating is not to be lower than the specified "Normal Operating Conditions," unless it is part of a range that extends into the "Normal Operating Conditions"		N/A
1.7.7	Wiring terminals intended to supply Class 2 outputs in accordance with NEC or CEC Part 1 or NEC are marked with the voltage rating and "Class 2" or equivalent	No such output terminal	N/A
	- Marking is located adjacent to the terminals		N/A
	- Marking is visible during wiring		N/A
2.5	Fuse providing Class 2, Limited Power Source, or TNV current limiting is not operator-accessible unless it is not interchangeable	No such fuse used	N/A
2.6	Equipment with isolated ground (earthing) receptacles is in compliance with NEC 250.146(D) and CEC 10-112 and 10-906(8)		N/A
2.7.1	Suitable NEC/CEC branch circuit protection rated at the maximum circuit rating is provided for all standard supply outlets and receptacles (such as supplied in power distribution units) if the supply branch circuit protection is not suitable.		N/A
	Power distribution transformers distributing power at 100 volts or more, and rated 10 kVA or more, provided with special transformer overcurrent protection		N/A
3.2	Wiring methods (terminals, leads, etc.) used for the connection of the equipment to the mains is in accordance with the NEC/CEC	Not directly connected to the mains	N/A
3.2.1	Attachment plugs of power supply cords are rated not less than 125 percent of the rated current of the equipment		N/A
3.2.1.2	Equipment connected to a centralized d.c. power system, and having one pole of the DC mains input terminal connected to the main protective earthing terminal in the equipment comply with special earthing, wiring, marking and installation instruction requirements		N/A
3.2.3	Permanent connection of equipment to the mains supply by a power supply cord is not permitted, except for certain equipment, such as ATMs		N/A
3.2.5	Power supply cords are no longer than 4.5 m in length		N/A
	Minimum cord length is 1.5 m, with certain constructions such as external power supplies allowed to consider both input and output cord lengths into the requirement		N/A
	Flexible power supply cords are compatible with Article 400 of the NEC, and Tables 11 and 12 of the CEC		N/A

UL 60950_1F ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
3.2.9	Permanently connected equipment has a suitable wiring compartment and wire bending space		N/A
3.3	Wiring terminals and associated spacings for field wiring connections comply with CSA C22.2 No. 0	No such wiring terminal used	N/A
3.3.3	Wire binding screws are not attached with conductors larger than 10 AWG (5.3 mm <sup>2</sup> )		N/A
3.3.4	Terminals for permanent wiring, including protective earthing terminals, are suitable for Canadian/US wire gauge sizes, are		N/A
	- rated 125 per cent of the equipment rating, and		N/A
	- are specially marked when specified (1.7.7)		N/A
3.3.5	Revise first column of Table 3E to "Smaller of the RATED CURRENT of the equipment or the PROTECTIVE CURRENT RATING of the circuit under consideration"		N/A
3.4.2	Motor control devices are provided for cord-connected equipment with a motor if the equipment is rated more than 12 A,	No motor used	N/A
	- or if the motor has a nominal voltage rating greater than 120 V		N/A
	- or is rated more than 1/3 hp (locked rotor current over 43 A)		N/A
3.4.8	Vertically-mounted disconnect switches and circuit breakers have the "on" position indicated by the handle in the up position		N/A
3.4.11	For computer room applications, equipment with battery systems capable of supplying 750 VA for five minutes have a battery disconnect means that may be connected to the computer room remote power-off circuit		N/A
4.3.12	The maximum quantity of flammable liquid stored in equipment complies with NFPA 30		N/A
4.3.13.5.1	Equipment with lasers meets the U.S. Code of Federal Regulations 21 CFR 1040 (and the Canadian Radiation Emitting Devices Act, REDR C1370).	No lasers	N/A
4.7	For computer room applications, automated information storage systems with combustible media greater than 0.76 m <sup>3</sup> (27 cu ft) have a provision for connection of either automatic sprinklers or a gaseous agent extinguishing system with an extended discharge	No computer room application	N/A
4.7.3.1	For computer room applications, enclosures with combustible material measuring greater than 0.9m <sup>2</sup> (10 sq ft) or a single dimension greater than 1.8 m (6 ft) have a flame spread rating of 50 or less		N/A

UL 60950_1F ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

	For other applications, enclosures with the same dimensions require a flame spread rating of 200 or less		N/A
4.7.3.1	Non-metallic enclosures of equipment for use in spaces used for environmental air (plenums) are required to comply with UL 2043		N/A
Annex H	Equipment that produces ionizing radiation complies with U.S. Code of Federal Regulations, 21 CFR 1020 (and the Canadian Radiation Emitting Devices Act, REDR C1370)	No ionizing radiation	N/A

<b>Other National Differences</b>			
1.5.1	Some components and materials associated with the risk of fire, electric shock, or personal injury have component or material ratings in accordance with the applicable national (Canadian and/or U.S.) component or material standard requirements. These components include: attachment plugs, battery backup systems, battery packs, cathode ray tubes, circuit breakers, communication circuit accessories, connectors (used for current interruption of non-LPS circuits), cord sets and power supply cords, direct plug-in equipment, electrochemical capacitor modules (energy storage modules with ultracapacitors), enclosures (outdoor), flexible cords and cables, fuses (branch circuit), fuseholders, ground-fault current interrupters, industrial control equipment, insulating tape, interconnecting cables, lampholders, limit controls, printed wiring, protectors for communications circuits, receptacles, solid state controls, supplementary protectors, switches (including interlock switches), thermal cut-offs, thermostats, (multi-layer) transformer winding wire, surge protective devices, tubing, vehicle battery adapters, wire connectors, and wire and cables		P
1.6.1.2	A circuit for connection to the DC Mains Supply is classified as a SELV Circuit, TNV-2 Circuit or Hazardous Voltage Circuit depending on the maximum operating voltage of the supply	Not connected to the DC mains	N/A
	This maximum operating voltage includes consideration of the battery charging "float voltage" associated with the intended supply system, regardless of the marked power rating of the equipment		N/A

UL 60950_1F ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
2.3.1	For TNV-2 and TNV-3 circuits with other than ringing signals and with voltages exceeding 42.4 V <sub>peak</sub> or 60 Vd.c., the maximum acceptable current through a 2000 ohm resistor (or greater) connected across the voltage source with other loads disconnected is 7.1 mA peak or 30 mA d.c. under normal operating conditions	No TNV-2 and TNV-3 circuits	N/A
2.3.2.1	In the event of a single fault between TNV and SELV circuits, the limits of 2.2.3 apply to SELV Circuits and accessible conductive parts		N/A
2.6.2	Equipment with functional earthing marked with the functional earthing symbol (IEC 60417-6092)	Class III equipment	N/A
2.6.3.4	Protective bonding conductors of non-standard protective bonding constructions (e.g., printed circuit traces) may be subjected to the additional limited short circuit test conditions specified		N/A
4.2.8.1	Enclosures around CRTs with a face diameter of 160 mm or more reduce the risk of injury due to the implosion of the CRT	No CRT used	N/A
4.3.2	Equipment with handles complies with special loading tests	No handle provide	N/A
4.3.8	Battery packs for both portable and stationary applications comply with special component requirements	No battery used	N/A
5.1.8.3	Equipment intended to receive telecommunication ringing signals comply with a special touch current measurement tests	No such function	N/A
5.3.7	Internal (e.g., card cage) SELV circuit connectors and printed wiring board connectors that are accessible to the operator and that deliver power are overloaded		N/A
	During abnormal operating testing, if a circuit is interrupted by the opening of a component, the test is repeated twice (three tests total) using new components as necessary		N/A
6.4	Equipment intended for connection to telecommunication network outside plant cable is protected against overvoltage from power line crosses in accordance with 6.4 and Annex NAC		N/A
Annex EE	Articulated accessibility probe (Fig EE.3) is used for assessing accessibility to document/media shredders instead of the Figure 2A test finger		N/A
Annex M.2	Continuous ringing signals up to 16 mA only are permitted if the equipment is subjected to special installation and performance restrictions		N/A
Annex NAD	Equipment connected to a telecommunication and cable distribution networks and supplied with an earphone intended to be held against, or in the ear comply with special acoustic pressure requirements		N/A

-- End of Report --

**Product:** Li-ion Polymer Battery

**Report No.:** 50048525 001

**Type Designation:** BL0750F5030481S1PC\*C (\*=A, B, C, J, K, L, M, N, P, Q, R, T, U, V, 1, 2, 3, 4, 5, 6, 7, 8, 9)

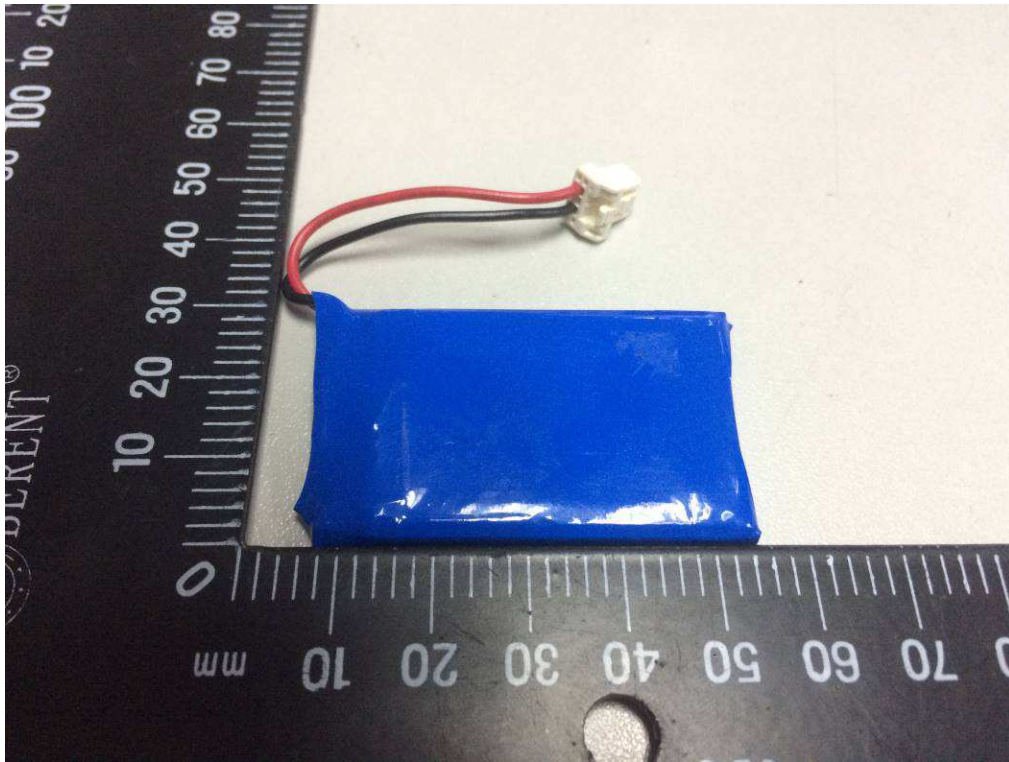


Figure 1 Front view of battery pack

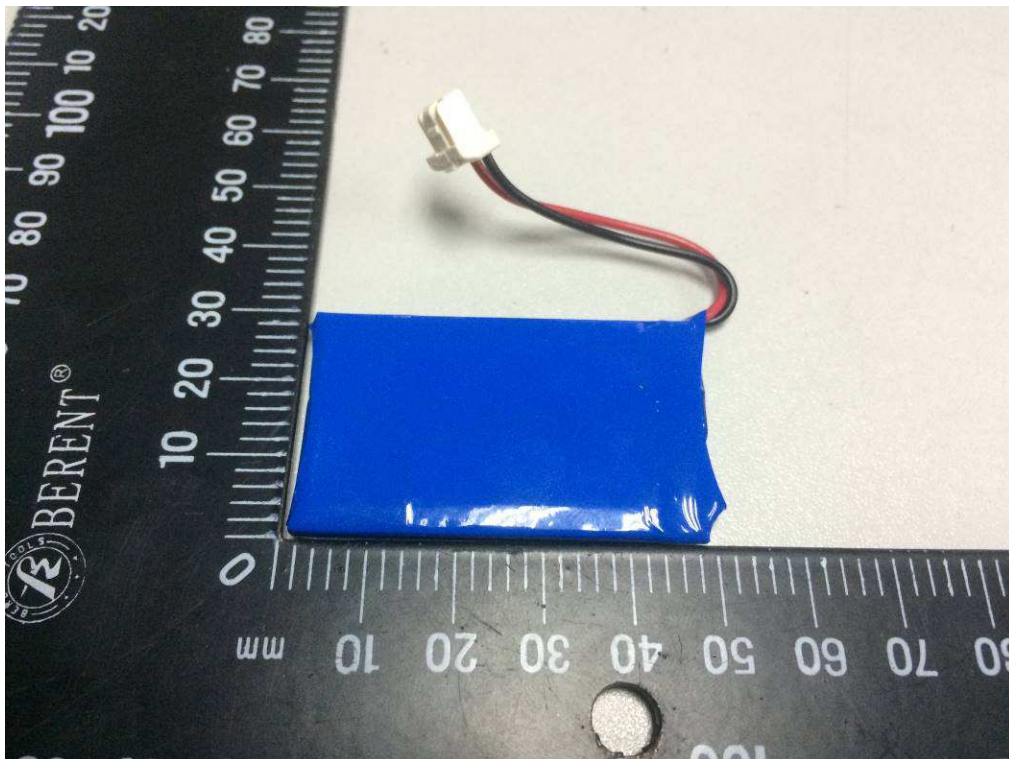


Figure 2 Back view of battery pack



**Product:** Li-ion Polymer Battery

**Report No.:** 50048525 001

**Type Designation:** BL0750F5030481S1PC\*C (\*=A, B, C, J, K, L, M, N, P, Q, R, T, U, V, 1, 2, 3, 4, 5, 6, 7, 8, 9)

Figure 3 Internal view of battery pack

Figure 4 Internal view of battery pack

**Product:** Li-ion Polymer Battery

**Report No.:** 50048525 001

**Type Designation:** BL0750F5030481S1PC\*C (\*=A, B, C, J, K, L, M, N, P, Q, R, T, U, V, 1, 2, 3, 4, 5, 6, 7, 8, 9)

Figure 5 TOP view of PCB

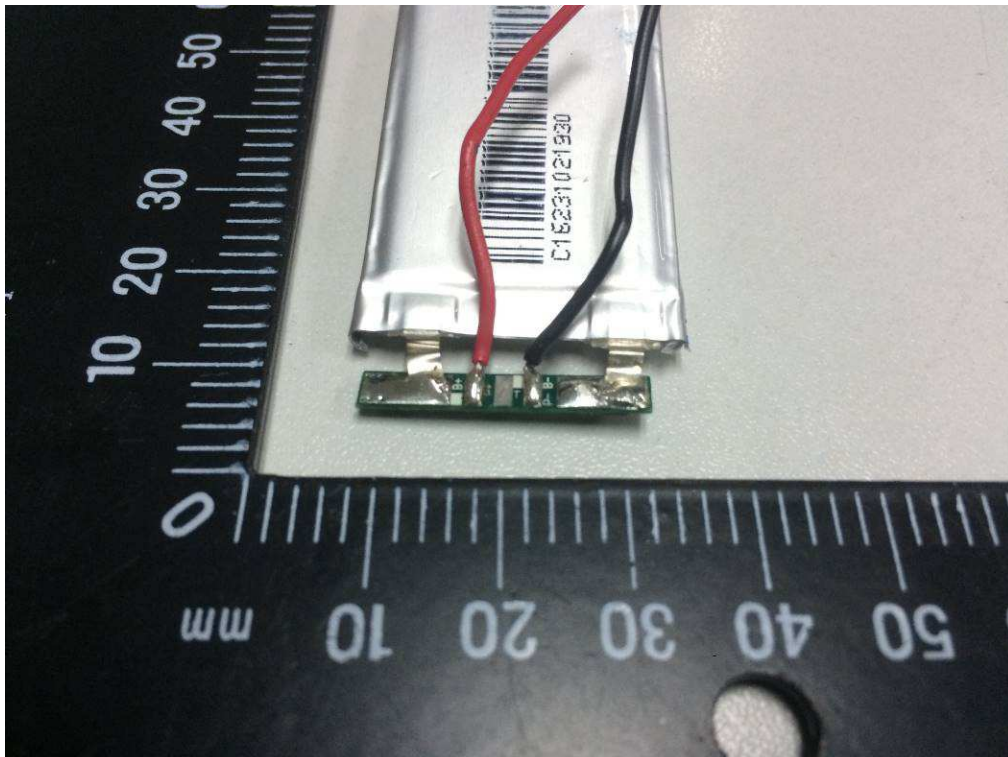


Figure 6 Bottom view of PCB

**Product:** Li-ion Polymer Battery

**Report No.:** 50048525 001

**Type Designation:** BL0750F5030481S1PC\*C (\*=A, B, C, J, K, L, M, N, P, Q, R, T, U, V, 1, 2, 3, 4, 5, 6, 7, 8, 9)

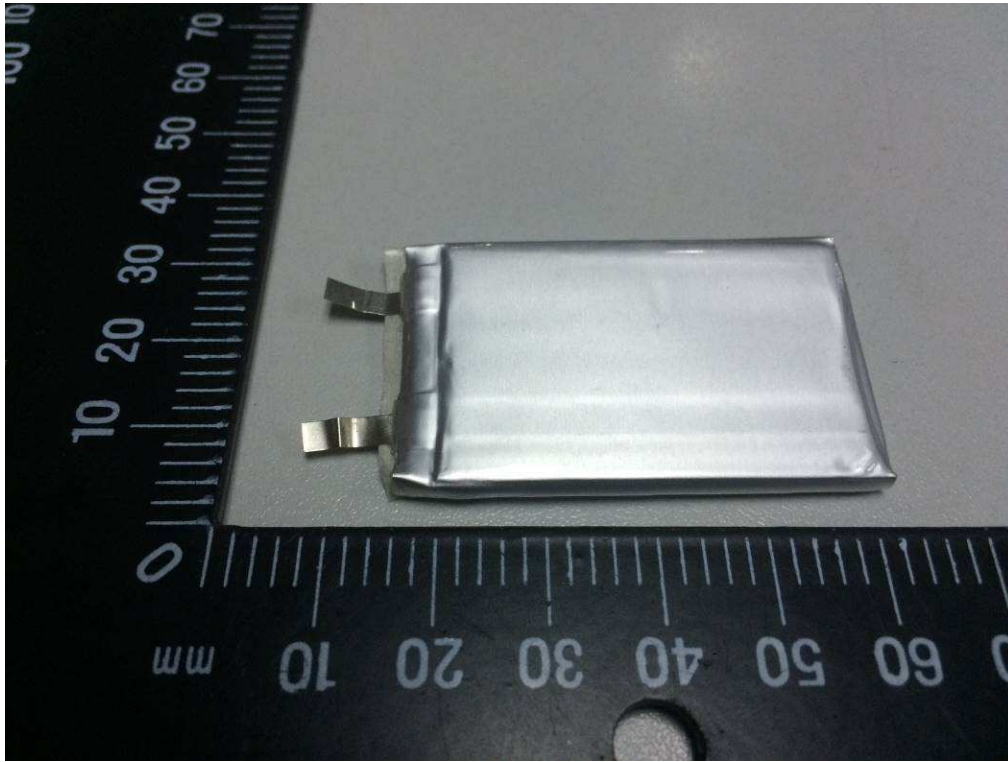


Figure 7 Front view of cell