TEST REPORT
UL 1642
Standard for Lithium Batteries

Report Number:	22ITC0217046S
Standard:	UL 1642:September 29, 2020 (Standard for Lithium Batteries)
Product:	MagEZ Slider
Brand Name:	PITAKA
Model:	695466
Rating:	3.85VDC
Applicant Name and Address:	Shenzhen Lingyi Innovation Technology Co.,Ltd. 12 F, Block C, Central Avenue Building, Xixiang Boulevard Baoan District, Shenzhen.Guangdong，CN
Manufacturer Name and Address:	Shenzhen Lingyi Innovation Technology Co.,Ltd. 12 F, Block C, Central Avenue Building, Xixiang Baoan District, Shenzhen.Guangdong，CN
Tested by:	Max Zhuang
Reviewed by:	Apple Huang
Approved by:	John Liu
Date of issue:	Feb.21, 2022
Lab performing tests:	Shenzhen iTC Product Testing Co., Ltd.
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Test item particulars:	
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 ..... :	MagEZ Slider
Nominal voltage..... :	3.3V
Rated capacity..... :	4000mAh
Maximum charge voltage ..... :	3.85V
End discharge voltage ..... :	3.0V
Trade mark ..... :	N/A
Utilization Type……:	Battery cell
Sample number ……:	ITC SF-695466
Possible test case verdicts:	
Test case does not apply to the test object ..... :	N/A
Test object does meet the requirement..... :	P(ass)
Test object does not meet the requirement..... :	F(ail)
Testing:	
Date of receipt of test item ..... :	Feb.12, 2021
Date(s) of performance of tests ..... :	Feb.12, 2021 to Feb.22, 2021

General remarks:

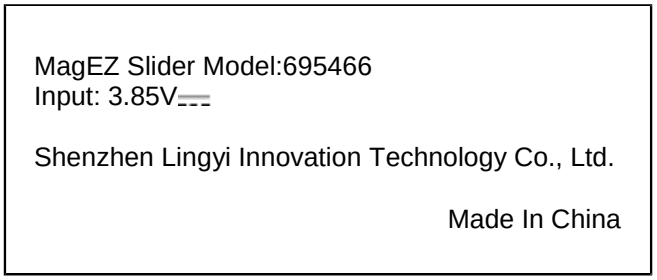
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The test results presented in this report relate only to the object tested.

"(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.



Summary of testing:

The component cells are evaluated in this test report per the following test items according to **UL 1642: 2012 R6.15.**

Charging method declared by the manufacturer in specifications: Charging the battery with 60mA constant current until 3.3V.

Test items:

cl.10 Short-Circuit Test;
cl.11 Abnormal Charging Test;
cl.13 CrushTest;
cl.14 ImpactTest;
cl.15 Shock Test;
cl.16 Vibration Test;
cl.17 Heating Test;
cl.18 Temperature Cycling Test;
cl.19 Low Pressure (Altitude Simulation) Test;
cl.20 Projectile Test

Description of the product:

These tested samples are one single Rechargeable Li-ion cell and doesn't have any over current and short-circuits proof circuit.
1) These tested cells have 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 tested cells were 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.
3) The end product shall be kept away from fire and high temperature area.

- Table 1: The electrical parameters:

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UL1642:2012			
Clause	Requirement + Test	Result - Remark	Verdict
INTRODUCTION			
1	**Scope**		P
2	**General**		P
3	**Glossary**		P
CONSTRUCTION			
4	**General**		N/A
4.1	**Casing**		N/A
4.1.1	The casing of a lithium battery shall have the strength and rigidity necessary to resist the abuses to which it may be subjected, without resulting in a risk of fire. The casing of a user-replaceable lithium battery shall have the strength and rigidity necessary to resist the abuses to which it may be subjected without resulting in a risk of injury to persons.	Rechargeable Polymer Li-ion Cell without enclosure	N/A
4.1.2	A cell of a user-replaceable battery shall be in a rigid casing of sufficient strength to prevent flexing. A tool providing the mechanical advantage of a pliers, screwdriver, or hacksaw shall be the minimum capable of opening the user-replaceable cell casing, if opening of the casing will expose metallic lithium.	See above	N/A
4.2	**Electrolyte**		N/A
4.2.1	A user-replaceable battery shall not contain pressurized vapor or liquid that could spray materials into the eyes or leak more than 5 milliliters of liquid when the battery casing is punctured under normal laboratory conditions, 23 ±2°C (73 ±3.6°F).	Technician-replaceable Cell	N/A
4.3	**Use**		N/A
4.3.1	A lithium battery shall be protected from abnormal charging currents during use. A battery tested and found acceptable for the charging current, I_C (see Section 11), under fault conditions specified by the manufacturer, shall be protected from larger charging currents in the end product application by: a) Two blocking components, such as diodes, or b) One blocking component and one current limiting component, such as a resistor or a fuse. The current limiting component shall limit the charging current to one-third the value used in the Abnormal Charging Test, Section 11.	Cell only	N/A
PERFORMANCE			
5	**General**		P
5.1	**Technician-replaceable Batteries**		P

UL1642:2012			
Clause	Requirement + Test	Result - Remark	Verdict
5.1.1	Technician-replaceable lithium cells or batteries are to be tested as described in Sections 10 – 20. Section 12, Forced-Discharge Test, is applicable only to cells intended to be used in series-connected multicell applications such as battery packs. For multicell installations, also see 5.3.1.		P
5.1.2	When a fire or explosion occurs as a result of the Crush Test, Section 13, or the Impact Test, Section 14, or the cell or battery ruptures to the extent that the aluminum test cage is penetrated during the Projectile Test, Section 20; the use of the technician replaceable cell or battery shall be restricted to applications in which it is not exposed to, or is protected from, any conditions shown to cause a fire or explosion.	No fire or explosion occurs	P
5.1.3	Cells and batteries subjected to the Shock Test, Section 15, Vibration Test, Section 16, Temperature Cycling Test, Section 18, and Low Pressure (Altitude Simulation) Test, Section 19, shall also not leak or vent. For these tests, unacceptable leakage is determined to have occurred when the resulting mass loss exceeds the values shown in Table 5.1, Venting and leakage mass loss criteria.	No leak or vent	P
5.2	**User-replaceable Batteries**		N/A
5.2.1	User-replaceable lithium cells or batteries are to be tested as described in Sections 10-20. Section 12, Forced Discharge Test, is applicable only to cells intended to be used in multicell applications such as battery packs. In addition to complying with the requirements for a technician replaceable cell or battery as specified in 5.1.1, a user-replaceable cell or battery shall not explode or ignite when subjected to the Crush Test, Section 13, or the Impact Test, Section14.	Technician-replaceable Cell	N/A
5.2.2	Sets of five specimens each are to be used for the Projectile Test, Section 20.3; see Table 6.3. When only one specimen from a set of five does not comply with the requirements, another set of five specimens is to be tested. All specimens from this second set shall comply with the requirements.	Technician-replaceable Cell	N/A
5.3	**Multi-cell Installation**		N/A
5.3.1	A technician-replaceable or user-replaceable cell intended for use in multicell installations or battery packs shall also be tested as described in 10.3 and Section 12. No fire or explosion shall occur as a result of these tests. In addition, batteries subjected to the test described in 10.3 shall meet the requirements as described in 5.1.1 and 5.2.1 for a cell or battery subjected to the Short-Circuit Test, Section10.	Single cell	N/A

UL1642:2012			
Clause	Requirement + Test	Result - Remark	Verdict
6	**Samples**		P
6.1	Fully charged primary cells or batteries and primary cells or batteries that have been conditioned by partial or complete discharge, or both, are to be used for the tests described in Sections 10-20. The number of samples to be used in each test for a primary technician-replaceable cell or battery is shown in Table 6.1. The number of samples to be used in each test for a primary user-replaceable cell or battery is shown in Table 6.3. When a group of cells or batteries of different sizes, but similar chemistries is involved, selected sizes representative of the range are to be tested.	The samples are Rechargeable Polymer Li-ion Cell.	N/A
6.2	Fully charged secondary cells or batteries and secondary cells or batteries that have been conditioned by charge-discharge cycling are to be used for the tests described in Sections 10 – 20. The number of samples to be used in each test for a secondary technician-replaceable cell or battery is shown in Table 6.2. The number of samples to be used in each test for a secondary user-replaceable cell or battery is shown in Table 6.4. When a group of cells or batteries of different sizes, and similar chemistries is involved, selected sizesrepresentative of the range are to be tested.	Prepared as required.	P
6.3	Prior to conducting the testing in Section 17, the lithium ion cell samples shall be pre-conditioned as outlined in 6.4 and 6.5.	Prepared as required.	P
6.4	For the heating test of Section 17, two sets of five lithium ion cell samples are to be fully discharged (i.e. to the manufacturer's specified end point voltage). The samples are then placed in a test chamber and conditioned for 1 to 4 h (5 samples at the upper temperature limit and 5 samples at the lower temperature limit of the operating region) as outlined in Table 6.3.	Prepared as required.	P
6.5	While still in the test chamber set at the temperature limits, the samples are charged (5 samples at the upper temperature limit and 5 samples at lower temperature limit) at the specified maximum charging current and upper limit charging voltageper Table 6.3, using a constant voltage charging method. Charging is continued until the charge current is reduced to the specified end of charge conditions (i.e. 0.05 times the charge current).	Prepared as required.	P
7	**Conditioning of Samples**		P
7.1	**Discharge**		N/A

UL1642:2012			
Clause	Requirement + Test	Result - Remark	Verdict
7.1.1	Primary batteries are to be completely discharged by connecting their terminals through resistors that provide the desired level of discharge within 60 days. Completely discharged is considered to be the state in which the closed-circuit voltage has been reduced to less than 0.2 volts and the short-circuit current to less than 1.0 milliamperes. Batteries are to be discharged at room temperature. Cells with a liquid cathode such as thionyl chloride or sulfur dioxide, shall also be conditioned by one-half discharge		N/A
7.1.2	For solid electrolyte and other types of primary lithium batteries that cannot be discharged within 60 days because of the small currents they inherently produce, longer discharge times plus discharge at higher temperatures may be used to obtain the desired level of discharge. The manufacturer's recommended discharge procedures are to be followed so as to obtain the required discharge level in the minimum time.		N/A
7.2	**Charge-discharge cycling**		P
7.2.1	Secondary cells are to be conditioned at 25°C (77°F). Cells are continuously cycled as per the manufacturer's specifications. The specification shall be such that the full rated capacity of the cell is utilized and the number of cycles accumulated shall be at least equal to 25 percent of the advertised cycle life of the cell or cycled continuously for 90 days, whichever is shorter. Cycling is to be done either individually or in groups. Cells are to be recharged prior to testing as indicated in Table 6.2 and Table 6.4.	The samples are cycled at manufacturer's factory before they were sent for test.	P
8	**Important test considerations**		P
8.1	Some lithium batteries are capable of exploding when the tests described in Sections 10-20 are conducted. It is important that personnel be protected from the flying fragments, explosive force, sudden release of heat, and noise that results from such explosions. The test area is to be well ventilated to protect personnel from possible harmful fumes or gases.	Prepared the tests as required.	P
8.2	As an additional precaution, the temperatures on the surface of the battery casings shall be monitored during the tests described in Sections 10, 12, 13, and 14. All personnel involved in the testing of lithium batteries are to be instructed never to approach a lithium battery while the surface temperature exceeds 90°C (194°F).	Prepared the tests as required.	P
8.3	For protection, the Projectile Test, Section 20 is to be conducted in a room separate from the observer.	Prepared the tests as required.	P
9	**Temperature measurements**		P

UL1642:2012			
Clause	Requirement + Test	Result - Remark	Verdict
9.1	Temperatures are to be measured by thermocouples consisting of wires not larger than 24 AWG (0.21 mm2) and not smaller than 30 AWG (0.05 mm2) and a potentiometer-type instrument.	Prepared the tests as required.	P
9.2	The temperature measurements on the batteries are to be made with the measuring junction of the thermocouple held tightly against the metal casing of the battery.	Prepared the tests as required.	P
TESTS FOR TECHNICIAN-REPLACEABLE AND USER-REPLACEABLE BATTERIES			
ELECTRICAL TESTS			
10	**Short-Circuit Test**		P
10.1	Each test sample battery, in turn, is to be short-circuited by connecting the positive and negative terminals of the battery with a circuit load having a maximum resistance load of 0.1 ohm. The battery is to discharge until a fire or explosion is obtained, or until it has reached a completely discharged state of less than 0.1 volts and the battery case temperature has returned to ±10°C (±18°F) of ambient temperature.	Tested as required. See table 10.	P
10.2	Tests are to be conducted at 20 ±5°C (68 ±9°F) and at 55 ±5°C (131 ±9°F). The batteries are to reach equilibrium at 20 ±5°C or 55 ±5°C, as applicable, before the terminals are connected.	Tested as required.	P
10.3	A battery is to be tested individually unless the 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 batteries to be covered for each configuration.	Tested as required.	P
10.4	When an overcurrent or thermal 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.	Only one single lithium-ion cell, no over-current or thermal protective device was integrated into the cell.	N/A
10.5	The samples shall not explode or catch fire. The temperature of the exterior cell or battery casing shall not exceed 150°C (302°F).	The test results meet the requirements.	P
11	**Abnormal Charging Test**		P
11.1	Primary cells or batteries shall comply with 11.2—11.7.	Secondary cell	N/A
11.2	Cells or batteries conditioned in accordance with Tables 6.1 or 6.3, as applicable, are to be used for this test. The batteries are to be tested in an ambient temperature of 20 ±5°C (68 ±9°F).		N/A

UL1642:2012			
Clause	Requirement + Test	Result - Remark	Verdict
11.3	Each test sample battery is to be subjected to a charging current of three times the current I, specified by the manufacturer by connecting it in opposition to a dc-power supply. The specified charging current is to be obtained by connecting a resistor of the specified size and rating in series with the battery. The test charging time is to be calculated using the formula: $t_c = \frac{2.5C}{3(I_c)}$, in which tc is the charging time in hour C is the capacity of the cell/batteiy in ampere-hours, and lc is the maximum charging current, in amperes, specified by the manufacturer. The minimum charging time is to be 7 hours.		N/A
11.4	When a non-resettable overcurrent or thermal protective device that has been investigated for the purpose operates during the test, the test is to be repeated at a charge current below the level that the protective device operates. When a resettable protective device operates during the test, the protector is allowed to reset to a total of 10 cycles; or until the appropriate charging time has been completed, but not less than 7 hours. A protective device that has not been investigated for the purpose is to be short-circuited. See 2.3.2.		N/A
11.5	The samples shall not explode or catch fire.		N/A
11.6	Secondary cells or batteries shall comply with 11.7—11.10.	See table 11, tested as required	P
11.7	Cells or batteries conditioned in accordance with Tables 6.2 or 6.4, as applicable, are to be used for this test. The batteries are to be tested in an ambient temperature of 20 ±5°C (68 ±9°F).	Tested as required.	P
11.8	Each test sample battery is to be discharged at a constant current of 0.2c/Ihour, to a manufacturer specified discharge endpoint voltage. The cell or battery is then to be charged with a constant maximum specified output voltage and a current limit of three times the maximum charging current, I, specified by the manufacturer. Charging duration is to be 7 hours or the time required to reach the manufacturer's specified end-of-charge condition, whichever is greater.	Tested as required.	P

UL1642:2012			
Clause	Requirement + Test	Result - Remark	Verdict
11.9	The cell/battery is to be tested without the assistance of overcurrent or thermal protective devices, unless such protective devices have been investigated for the purpose. When a non-resettable overcurrent or thermal protective device operates during the test, the test shall be repeated at an overcharging current below the level that the protection device operates. When a resettable protective device operates during the test, the protector is to be allowed to reset to a total of 10 cycles; or until the appropriate charging time has been completed, but not less than 7 hours. A protective device that has not been investigated for the purpose is to be short-circuited. See 2.3.2.	The samples are to be tested without any assistance of over-current or thermal protective devices.	P
11.10	The samples shall not explode or catch fire.	No explosion or catch fire during and after the test	P
12	**Forced-Discharged Test**		N/A
12.1	This test is intended for cells that are to be used in series-connected, multicell applications, such as battery packs.	One single cell	N/A
12.2	A completely 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 maximum number less one of the cells to be covered for series use. Five cells are to be completely discharged, at room temperature.		N/A
12.3	Once the completely discharged cell is connected in series with the specified number of fully charged cells the resultant battery pack is to be short circuited.		N/A
12.4	The positive and negative terminals of the sample are to be connected with a copper wire with a maximum resistance load of 0.1 ohm. The sample is to discharge until a fire or explosion is obtained, or until it has reached a completely discharged state of less than 0.2 volts and the battery case temperature has returned to ±10°C (18°F) of ambient temperature.		N/A
12.5	When an overcurrent or thermal protective device that has been investigated for the purpose operates 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
12.6	The samples shall not explode or catch fire.		N/A
MECHANICAL TESTS			
13	**Crush Test**		P

UL1642:2012			
Clause	Requirement + Test	Result - Remark	Verdict
13.1	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 ±1 kN (3000 ±224 lbs) is reached. Once the maximum force has been obtained it is to be released.	Tested as required. See table 13.	P
13.2	A cylindrical, pouch or prismatic cell is to be crushed with its longitudinal axis parallel to the flat surfaces of the crushing apparatus. A prismatic cell is also to be rotated 90° around its longitudinal axis so that both the wide and narrow sides will be subjected to the crushing force. Each sample is to be subjected to a crushing force in only one direction. Separate samples are to be used for each test. Exception: For lithium ion systems, a cylindrical, pouch or prismatic cell is to be crushed with its longitudinal axis parallel to the flat surfaces of the crushing apparatus. Each sample is to be subjected to a crushing force in only one direction. Test only the wide side of pouch and prismatic cells.	Tested as required. The cell is a prismatic cell.	P
13.3	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.	Not a coin or button battery	N/A
13.4	The samples shall not explode or catch fire.	No explosion or catch fire during and after the test	P
14	**Impact Test**		P
14.1	A test sample battery is to be placed on a flat surface. A 15.8 ±0.1-mm (5/8 ±0.004-in) diameter bar is to be placed across the center of the sample. A 9.1 ±0.46-kg (20 ±1-lb) weight is to be dropped from a height of 610 ±25 mm (24 ±1 in) onto the sample.	Prepared the test as required. See table 14	P

UL1642:2012			
Clause	Requirement + Test	Result - Remark	Verdict
14.2	A cylindrical, pouch or prismatic cell is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8-mm (5/8-in) diameter curved surface lying across the center of the test sample. A prismatic cell is also to be rotated 90° around its longitudinal axis so that both the wide and narrow sides aresubjected to the impact. Each sample is to be subjected to only a single impact. Separate samples are to be used for each test. Exception: For Lithium ion systems, a cylindrical, pouch or prismatic cell is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8-mm (5/8-in) diameter curved surface lying across the center of the test sample. Each sample is to be subjected to only a single impact. Test only the wide side of pouch and prismatic cells.	Tested as required.	P
14.3	A coin or button battery is to be impacted with the flat surface of the test sample parallel to the flat surface and the 15.8-mm (5/8-in) diameter curved surface lying across its center.	Not a coin or button battery	N/A
14.4	The samples shall not explode or catch fire.	No explosion or catch fire during and after the test	P
15	**Shock Test**		P
15.1	The cell is to be secured to the testing machine by means of a rigid mount which supports all mounting surfaces of the cell. Each cell shall be subjected to a total of three shocks of equal magnitUde. 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 localacceleration 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).	Prepared the test as required. See table 15.	P
15.2	The samples shall not explode or catch fire. In addition, the sample shall not vent or leak as described in 5.1.1.	No explosion or catch fire, the sample not vent or leak	P
16	**Vibration Test**		P
16.1	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].	Prepared the test as required. See table 16.	P

UL1642:2012			
Clause	Requirement + Test	Result - Remark	Verdict
16.2	The frequency is to be varied at the rate of 1 hertz per minute between 10 and 55 hertz, and return in not less than 90 nor more than 100 minutes. The battery is to be tested in three mutually perpendicular directions. For a battery that has only two axes of symmetry, the battery is to be tested perpendicular to each axis.	Tested as required.	P
16.3	The samples shall not explode or catch fire. In addition the sample shall not vent or leak as described in 5.1.1.	The test results meet the requirements.	P
ENVIRONMENTAL TESTS			
17	**Heating Test**		P
17.1	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). 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 for 10 min. The sample shall return to room temperature (20±5°C) and then be examined. For batteries specified for temperatures above 100°C (212°F), the conditioning temperature shall be increased from 130 ±2°C (266±3.6°F), to 30±2°C (86±3.6°F) above the manufacturers maximum specified temperature. For a battery of lithium metal chemistry, the conditioning temperature shall be increased to a maximum of 170 ±2°C (338±3.6°F).	Tested as required.	P
17.2	The samples shall not explode or catch fire.	The test results meet the requirements.	P
18	**Temperature Cycling Test**		P
18.1	The batteries are to be placed in a test chamber and subjected to the following cycles: Raising the chamber-temperature to 70 ±3°C (158 ±5°F) within 30 minutes and maintaining this temperature for 4 hours. Reducing the chamber temperature to 20 ±3°C (68 ±5°F) within 30 minutes and maintaining this temperature for 2 hours. Reducing the chamber temperature to minus 40 ±3°C (minus 40 ±5°F) within 30 minutes and maintaining this temperature for 4 hours. Raising the chamber temperature to 20 ±3°C (68 ±5°F) within 30 minutes. Repeating the sequence for a further 9 cycles. After the 10th cycle, storing the batteries for a minimum of 24 hours, at a temperature of 20 ±5°C (68 ±9°F) prior to examination.	Tested as required. See table 18.	P

UL1642:2012			
Clause	Requirement + Test	Result - Remark	Verdict
18.2	The samples shall not explode or catch fire. In addition, the samples shall not vent or leak as described in 5.1.1.	The test results meet the requirements.	P
19	**Low Pressure (Altitude Simulation) Test**		P
19.1	Sample batteries are to be stored for 6 hours at an absolute pressure of 11.6 kPa (1.68 psi) and a temperature of 20 ± 3°C (68 ± 5°F).	Tested as required. See table 19	P
19.2	The samples shall not explode or catch fire as a result of the Altitude Simulation Test. In addition, the samples shall not vent or leak as described in 5.1.1.	The test results meet the requirements.	P
TESTS FOR USER-REPLACEABLE LITHIUM BATTERIES			
20	**Projectile Test**		P
20.1	When subjected to the test described in 20.2 - 20.5 no part of an exploding cell or battery shall penetrate the wire screen such that some or all of the cell or battery protrudes through the screen.	The test results meet the requirements.	P
20.2	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 0.017 inch (0.43 mm).	Prepared the test as required.	P
20.3	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.	Prepared the test as required.	P
20.4	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 20.1. 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.	Tested as required.	P
20.5	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.	Tested as required.	P
MARKING			
21	**General**		P

UL1642:2012			
Clause	Requirement + Test	Result - Remark	Verdict
21.1	A battery shall be legibly and permanently marked with: The manufacturer's name, trade name, or trademark or other descriptive marking by which the organization responsible for the product may be identified; A distinctive ("catalog" or "model") number or the equivalent; The date or other dating period of manufacture not exceeding any three consecutive months.	See marking plate on page 3.	P
21.2	If a manufacturer produces a battery at more than one factory, each battery package shall have a distinctive marking to identify it as the product of a particular factory.	One single factory.	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
MagEZ Slider	Shenzhen Lingyi Innovation Technology Co., Ltd.	695466	3.85V,	UL 1642	Tested with appliance

10	TABLE: Short-Circuit Test				P
Fully Charged Cell					
Ambient temperature: 24.3°C					
Sample No.	ITC SF-695466 C1#	ITC SF-695466 C2#	ITC SF-695466 C3#	ITC SF-695466 C4#	ITC SF-695466 C5#
Tmax(°C)	122.3	125.4	126.0	124.4	121.6
Failure Mode	No	No	No	No	No
Ambient temperature: 55.4°C					
Sample No.	ITC SF-695466 C11#	ITC SF-695466 C12#	ITC SF-695466 C13#	ITC SF-695466 C14#	ITC SF-695466 C15#
Tmax(°C)	116.2	124.7	125.2	120.4	126.9
Failure Mode	No	No	No	No	No
Cycled Cell					
Ambient temperature: 24.3°C					
Sample No.	ITC SF-695466 C6#	ITC SF-695466 C7#	ITC SF-695466 C8#	ITC SF-695466 C9#	ITC SF-695466 C10#
Tmax(°C)	123.5	121.0	119.1	126.2	125.3
Failure Mode	No	No	No	No	No
Ambient temperature: 55.4°C					
Sample No.	ITC SF-695466 C16#	ITC SF-695466 C17#	ITC SF-695466 C18#	ITC SF-695466 C19#	ITC SF-695466 C20#
Tmax(°C)	119.3	118.5	114.0	123.1	124.5
Failure Mode	No	No	No	No	No
Supplementary information: Tmax was recorded on the centre of the cell surface. No explode or catch fire. The temperature of the cell casing does not exceed 150°C.					

11	TABLE: Abnormal Charging Test					P
Ambient temperature: 23.1°C						
Id	50 mA		Ue		3.0 V	
Ic	50 mA		Uc		3.3 V	
Fully Charged Cell						
Sample No.	ITC SF-695466 C21#	ITC SF-695466 C22#	ITC SF-695466 C23#	ITC SF-695466 C24#	ITC SF-695466 C25#	
Tmax(°C)	39.8	39.1	39.2	39.3	39.4	
Failure Mode	No	No	No	No	No	

Cycled cell					
Sample No.	ITC SF-695466 C26#	ITC SF-695466 C27#	ITC SF-695466 C28#	ITC SF-695466 C29#	ITC SF-695466 C30#
Tmax(°C)	42.4	41.9	42.6	42.5	42.0
Failure Mode	No	No	No	No	No
Supplementary information: Tmax was recorded on the centre of the cell surface; No explode or catch fire.					

13	**TABLE: Crush Test**				**P**
Ambient temperature: 23.5°C					
Fully Charged Cell					
Sample No.	ITC SF-695466 C31#	ITC SF-695466 C32#	ITC SF-695466 C33#	ITC SF-695466 C34#	ITC SF-695466 C35#
Tmax(°C)	25.0	24.6	23.5	24.3	25.0
Crush direction	Longitudinal axis	Longitudinal axis	Longitudinal axis	Longitudinal axis	Longitudinal axis
Failure mode	No	No	No	No	No
Cycled cell					
Sample No.	ITC SF-695466 C36#	ITC SF-695466 C37#	ITC SF-695466 C38#	ITC SF-695466 C39#	ITC SF-695466 C40#
Tmax(°C)	24.8	24.7	24.6	24.7	24.5
Crush direction	Longitudinal axis	Longitudinal axis	Longitudinal axis	Longitudinal axis	Longitudinal axis
Failure mode	No	No	No	No	No
Supplementary information: no explosion or catch fire.					

14	**TABLE: Impact Test**				**P**
Ambient temperature: 23.9°C					
Fully Charged Cell					
Sample No.	ITC SF-695466 C41#	ITC SF-695466 C42#	ITC SF-695466 C43#	ITC SF-695466 C44#	ITC SF-695466 C45#
Tmax(°C)	71.4	68.0	72.3	66.6	68.6
Impact direction	Longitudinal axis	Longitudinal axis	Longitudinal axis	Longitudinal axis	Longitudinal axis
Failure mode	No	No	No	No	No
Cycled cell					
Sample No.	ITC SF-695466 C46#	ITC SF-695466 C47#	ITC SF-695466 C48#	ITC SF-695466 C49#	ITC SF-695466 C50#
Tmax(°C)	68.4	72.3	75.6	72.1	74.3

Impact direction	Longitudinal axis	Longitudinal axis	Longitudinal axis	Longitudinal axis	Longitudinal axis
Failure mode	No	No	No	No	No
Supplementary information: no explosion or catch fire.					

15	**TABLE: Shock Test**				**P**
Ambient temperature: 23.8°C					
Fully Charged Cell					
Sample No.	ITC SF-695466 C51#	ITC SF-695466 C52#	ITC SF-695466 C53#	ITC SF-695466 C54#	ITC SF-695466 C55#
Mass before test (g)	6.025	6.133	6.011	6.033	6.039
Mass after test (g)	6.023	6.132	6.010	6.031	6.037
Cycled cell					
Sample No.	ITC SF-695466 C56#	ITC SF-695466 C57#	ITC SF-695466 C58#	ITC SF-695466 C59#	ITC SF-695466 C60#
Mass before test (g)	6.134	6.095	6.104	6.017	6.157
Mass after test (g)	6.134	6.094	6.103	6.016	6.157
Supplementary information: no explosion or catch fire, in addition the sample did not vent or leak. Max loss less than 0.1%					

16	**TABLE: Vibration Test**				**P**
Ambient temperature: 23.6°C					
Fully Charged Cell					
Sample No.	ITC SF-695466 C61#	ITC SF-695466 C62#	ITC SF-695466 C63#	ITC SF-695466 C64#	ITC SF-695466 C65#
Mass before test (g)	6.221	6.010	6.164	6.016	6.021
Mass after test (g)	6.220	6.009	6.162	6.015	6.019
Cycled cell					
Sample No.	ITC SF-695466 C66#	ITC SF-695466 C67#	ITC SF-695466 C68#	ITC SF-695466 C69#	ITC SF-695466 C70#
Mass before test (g)	6.095	6.067	6.157	6.011	6.007
Mass after test (g)	6.094	6.066	6.157	6.008	6.006
Supplementary information: no explosion or catch fire, in addition the sample did not vent or leak. Max loss less than 0.1%					

18	TABLE: Temperature Cycling Test				P
Ambient temperature: 24.1°C					
Fully Charged Cell					
Sample No.	ITC SF-695466 C91#	ITC SF-695466 C92#	ITC SF-695466 C93#	ITC SF-695466 C94#	ITC SF-695466 C95#
Mass before test (g)	6.101	6.128	6.080	6.112	6.126
Mass after test (g)	6.098	6.124	6.078	6.108	6.122
Cycled cell					
Sample No.	ITC SF-695466 C96#	ITC SF-695466 C97#	ITC SF-695466 C98#	ITC SF-695466 C99#	ITC SF-695466 C100#
Mass before test (g)	6.008	6.153	6.011	6.014	6.107
Mass after test (g)	6.006	6.150	6.009	6.010	6.103
Supplementary information: no explosion or catch fire, in addition the sample did not vent or leak. Max loss less than 0.1%					

19	TABLE: Low Pressure (Altitude Simulation) Test				P
Ambient temperature: 23.4°C					
Fully Charged Cell					
Sample No.	ITC SF-695466 C101#	ITC SF-695466 C102#	ITC SF-695466 C103#	ITC SF-695466 C104#	ITC SF-695466 C105#
Mass before test (g)	6.027	6.010	6.078	6.022	6.016
Mass after test (g)	6.026	6.008	6.078	6.020	6.015
Cycled cell					
Sample No.	ITC SF-695466 C106#	ITC SF-695466 C107#	ITC SF-695466 C108#	ITC SF-695466 C109#	ITC SF-695466 C110#
Mass before test (g)	6.070	6.090	6.012	6.008	6.083
Mass after test (g)	6.069	6.089	6.011	6.006	6.081
Supplementary information: no explosion or catch fire, in addition the sample did not vent or leak. Max loss less than 0.1%					

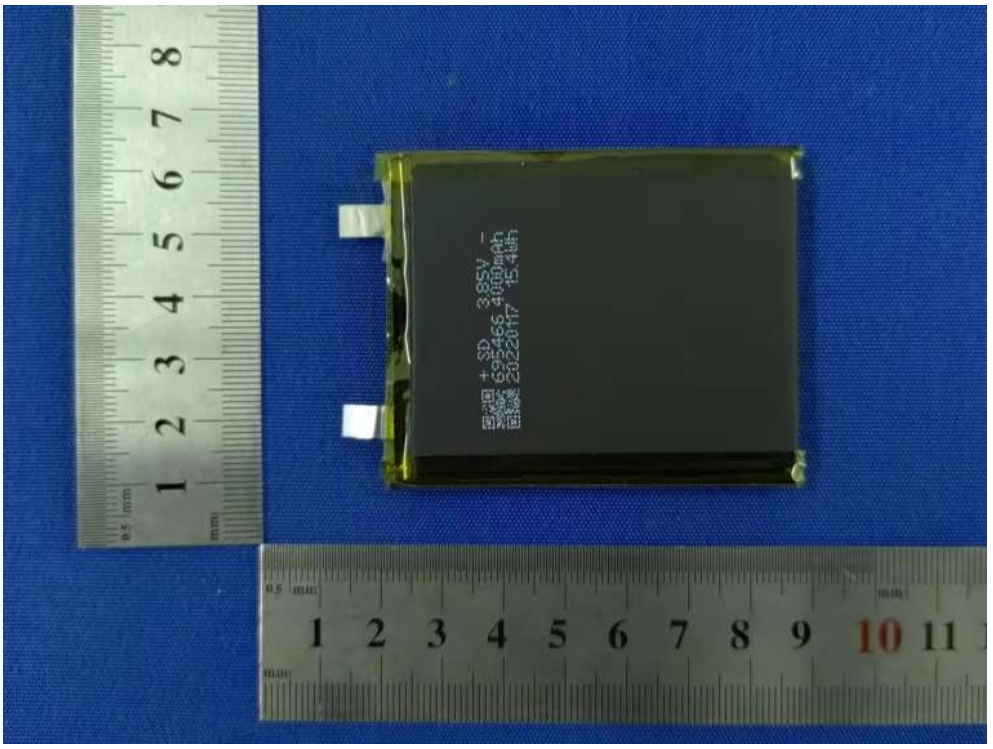


Photo.1

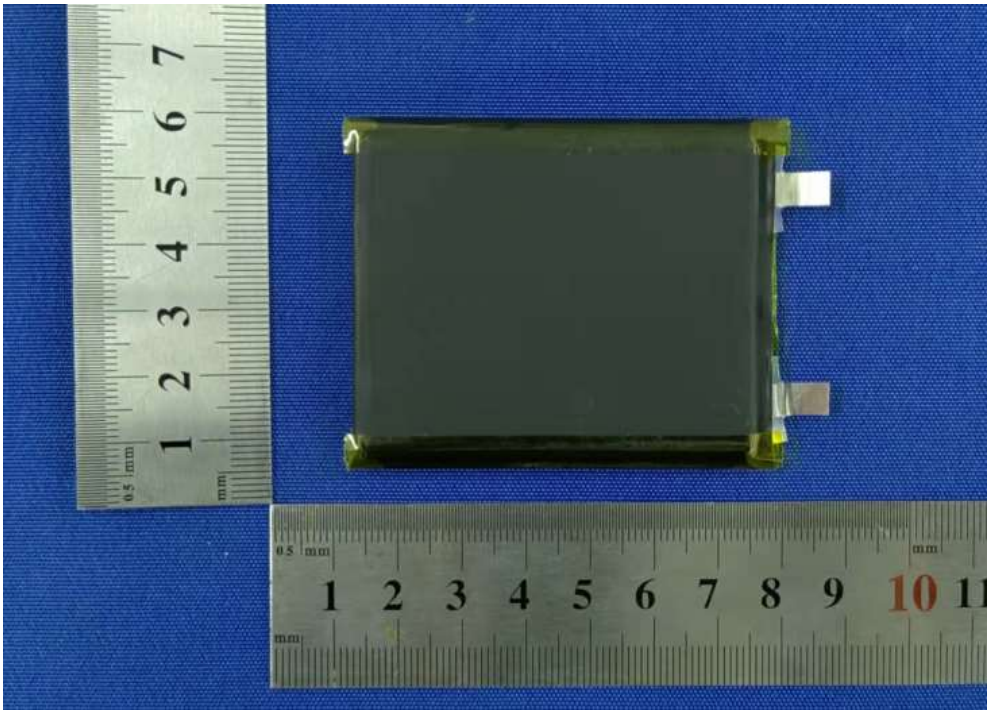


Photo.2