



## APPLICATION FOR LOW VOLTAGE DIRECTIVE

On Behalf of

**Rechargeable Li-ion Battery**

**Model: 401215**

**Prepared For :**

**Prepared By :**

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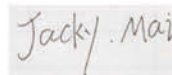
Date of Test:	Jan. 02, 2017 – Jan. 22, 2017
Date of Report:	Jan. 22, 2017
Report Number:	TMC160602006-S

**TEST REPORT**
**IEC 62133**

**Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications**

**Report**

Reference No..... TMC160602006-S



Tested by (+ signature)..... Jacky Mai

Approved by (+ signature).....

Mike Mo



Date of issue..... Jan. 22, 2017

Contents..... 16 pages

**Testing laboratory**

Name..... TMC Testing Services(Shenzhen) Co., Ltd.

Address..... D103, Tianhui Building, Yousong Road, Longhua District, Shenzhen, Guangdong, P. R. China

Testing location..... As same above

**Client**

Name.....:

Address.....:

**Test specification**

Standard.....: IEC 62133: 2012

Test procedure .....: Compliance with IEC 62133: 2012

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

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

**Test item**

Description.....: Rechargeable Li-ion Battery

Trademark.....: --

Model and/or type reference.....: 401215

Manufacturer.....:

Address.....:

 Rated.....: 3.7V<sup>---</sup>, 4 0mAh

**Test case verdicts**

Test case does not apply to the test object..... : N(A.)

Test item does meet the requirement..... : P(ass)

Test item does not meet the requirement..... : F(ail)

**Testing**

Date of receipt of test item ..... : Jan. 02, 2017

Date(s) of performance of test..... : Jan. 02, 2017 – Jun. 22, 2017

**General remarks**

This test 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 item tested.

"(see remark #)" refers to a remark appended to the report.

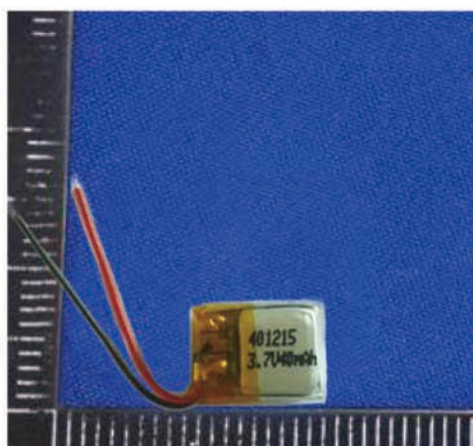
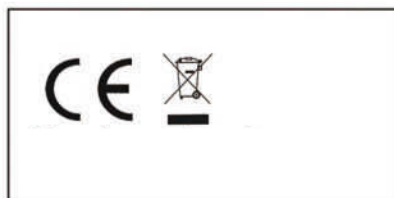
"(see appended table)" refers to a table appended to the report.

Remarks:

**Test result:**

All tests compliance with the standards of IEC 62133: 2012

Copy of marking plate





EN 62133			
Clause	Requirement – Test	Result - Remark	Verdict
1	General		P
	Parameter measurement tolerances		P
2	GENERAL SAFETY CONSIDERATIONS		P
	The safety of secondary cells and batteries requires the consideration of two sets of applied conditions:		P
	Cells and batteries subject to intended use be safe and continue to function in all respects	The appliance is not only safe but also continue functional in all respects under this condition	P
	Cells and batteries subject to reasonably for eseeable misuse do not present significant hazards.	Only fail to function such experience ( fire, burst/ explosion, leakage of cell electrolyte, venting, burns form excessive high external temperatures, rupture of battery case with exposure of internal components.)	P
2.1	INSULATION AND WIRING		P
	–Insulation Resistance between an accessible metal case (excluding electrical contacts) and positive terminals $\geq 5M\Omega$ at 500Vdc.	See appended table 2.1	P
	Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements	Insulation sheet is sufficient.	P
	Orientation of wiring maintains adequate creepage and clearance distances between conductors. Mechanical integrity of internal connections are sufficient to accommodate conditions of reasonably for reseeable misuse.		P
2.2	VENTING		P
	Battery cases and cells incorporate a pressure relief mechanism or are constructed so that they relieve excessive internal pressure at a value and rate that will preclude rupture, explosion and self-ignition.		P
	Encapsulant used to support cells within an outer casing does not cause the battery to overheat during normal operation no inhibit pressure relief.		P

EN 62133			
Clause	Requirement – Test	Result - Remark	Verdict
2.3	TEMPERATURE/CURRENT MANAGEMENT		N
	The batteries are designed such that abnormal temperature rise conditions are prevented.	Only cell	N
	Means is provided to limit current to safe levels during charge and discharge.		N
2.4	TERMINAL CONTACTS		P
	Terminals shall have clear polarity marking on the external surface of the battery.	Polarity marking is marked clearly, see picture 1 for details	P
	Terminals have a clear polarity marking on the external surface of the battery		P
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current.		P
	External terminal contact surfaces are formed from conductive materials with good mechanical strength and corrosion resistance.		P
	Terminal contacts are arranged to minimize the risk of short circuits.		P
2.5	ASSEMBLY OF CELLS INTO BATTERIES		N
	Cells used in the battery assembly have closely matched capacities, are of the same design, and are of the same chemistry and same manufacturer.	See product specification for details	N
	The battery incorporates separate circuitry to prevent cell reversal from uneven charges as the pack is designed for the selective discharge of a portion of its series connected cells.		N
2.6	QUALITY PLAN		P
	The manufacturer has prepared a quality plan that defines procedures for the inspection of materials, components, cells and batteries and which covers the whole process of producing each type of cell or battery.	The manufacture 's procedure control includes quality plan.	P
3	TYPE TEST CONDITIONS		P
	Tests were conducted with the number of cells or batteries as outlined in Table 1 of IEC 62133 with cells or batteries that were not more than 3 months old.	Performed	P



EN 62133			
Clause	Requirement – Test	Result - Remark	Verdict
	Unless noted otherwise in the test methods, testing was conducted in an ambient of 20°C ± 5°C.		P
4	SPECIFIC REQUIREMENTS AND TESTS		P
4.1	Charging procedure for test purposes	Charging voltage: 4.2V; Charging current: 40mA;	P
4.2	INTENDED USE		P
4.2.1	Continuous low-rate charging		P
	Fully charged cells are subjected for 28 days to a charge as specified by the manufacturer.		N
	Nickel systems: no fire, no explosion	See Table 4.2.1.	N
	Lithium systems: no fire, no explosion, no leakage		P
4.2.2	Vibration		P
	The measured open circuit voltage of the fully charged cells or batteries is within anticipated parameters		P
	The cells or batteries are subjected to a vibration sequence as outlined in Table 2 of IEC 62133 with amplitude of 0.75 mm and a total maximum excursion of 1.52 mm. The frequency was varied at the rate of 1 Hz/min between the limits of 10 Hz and 55 Hz. The entire range of frequencies (10 Hz to 55 Hz) and return (55 Hz to 10 Hz) was traversed in 90 min ± 5 min for each mounting position.	Performed	P
	The vibration was applied in each of three mutually perpendicular directions.		P
	Results: no fire, no explosion, no leakage	See Table 4.2.2.	P
4.2.3	Moulded case stress at high ambient temperature		P
	Fully charged batteries were placed in an aircirculating oven at a temperature of 70 °C ± 2 °C for 7 hours. Afterwards, they are removed and allowed to return to room temperature.		P
	Results: no physical distortion of the battery casing resulting in exposure if internal components.		P
4.2.4	Temperature cycling		P

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Clause	Requirement – Test	Result - Remark	Verdict
	Fully charged cells or batteries were subjected to temperature cycling (-20 °C, +75 °C) in forced draught chambers according to the procedure outlined in 4.2.4 b) and Fig. 1 of IEC 62133.		P
	After the fifth cycle, the cells or batteries were stored for 7 days prior to examination.	Performed. See appended table 4.2.4 for details	P
	Result: No fire, no explosion, no leakage.	No leakage, fire or explosion.	P
4.3	REASONABLY FORESEEABLE MISUSE		P
4.3.1	Incorrect installation of a cell (nickel systems only)		N
	Four fully charged cells of the same brand, type, size and age were connected in series with one of the four cells reversed. The assembly was connected across a 1-ohm resistor until the vent opens or until the temperature of the reversed cell returns to ambient temperature.		N
	Alternatively, a stabilized dc power supply was used simulate the conditions imposed on the reversed cell.		N
	Results: no fire, no explosion		N
4.3.2	External short circuit		P
	Fully charged cells or batteries were subjected to a short circuit test at $20\text{ °C} \pm 5\text{ °C}$ .		P
	Fully charged cells or batteries were subjected to a short circuit test at $55\text{ °C} \pm 5\text{ °C}$ .		P
	The external resistance did not exceed $100\text{ m}\Omega$ .		P
	The cells or batteries were tested for 24 h or until the case temperature declined by 20% of the maximum temperature rise.		P
	Results: no fire, no explosion		P
4.3.3	Free fall		P
	Fully charged cells or batteries were dropped 3 times from a height of 1.0 m onto a concrete floor.		P



EN 62133			
Clause	Requirement – Test	Result - Remark	Verdict
	Results: no fire, no explosion	Batteries was dropped three times form a height of 1.0m onto a concrete floor. The battery is dropped so as to obtain impacts in random orientations	P
4.3.4	Mechanical shock (crash hazard)		P
	Fully charged cells or batteries were subjected to a total of three shocks of equal magnitude applied in each of three mutually perpendicular directions. At least on of the directions was perpendicular to a flat face. During the initial 3 milliseconds, the minimum average acceleration was 75 g <sub>n</sub> . The peak acceleration was between 125 g <sub>n</sub> and 175 g <sub>n</sub> .		P
	Results: no fire, no explosion, no leakage	See appended table 4.3.4	P
4.3.5	Thermal abuse		P
	Fully charged cells were placed in a gravity or circulating air-convection oven. The oven temperature was raised at a rate of 5 °C /min $\pm$ 2 °C /min to a temperature of 130 °C $\pm$ 2 °C. The cell remained at that temperature for 10 minutes before the test was discontinued.		P
	Results: no fire, no explosion		P
4.3.6	Crushing of cells		N
	Fully charged cells were crushed between two flat surfaces with a hydraulic ram exerting a force of 13 kN $\pm$ 1 kN.		N
	A cylindrical or prismatic cell was crushed with its longitudinal axis parallel to the flat surfaces of the crushing apparatus.		N
	A second set of prismatic cells was tested, rotated 90 degrees around their longitudinal axis compared to the first set.		N
	Results: no fire, no explosion.		N
4.3.7	Low pressure		P
	A second set of prismatic cells was tested, rotated 90 degrees around their longitudinal axis compared to the first set.		P
	Results: no fire, no explosion.		P
4.3.8	Overcharge for nickel systems	The equipment is not nickel system	N

EN 62133			
Clause	Requirement – Test	Result - Remark	Verdict
	A discharged cell or battery was subjected to a highrate charge of 2.5 times the recommended charging current for a time that produced a 250% charge input (250% of rated capacity).		N
	Results: no fire, no explosion.		N
4.3.9	Overcharge for lithium systems		P
	A discharged cell was charged from a power supply of $\geq 10$ V, at a charging current $I_{rec}$ recommended by the manufacturer for 2.5 C5/ $I_{rec}$ hours.	$I_{rec} = 180\text{mA}$ 1.25 hours Power supply :10. 5 V	P
	Results: no fire, no explosion.		P
4.3.10	Forced discharge		N
	Discharged cells intended for use in multi-cell applications, were subjected to a reverse charge 1t 1.0 It (A) for 90 minutes.		N
	Results: no fire, no explosion		N
4.3.11	Cell protection against a high charging rate (lithium systems only)		P
	Discharged cells were charged at three times the charging current recommended by the manufacturer until the cells was fully charged or an internal safety devices cut off the charge current before the cell became fully charged.		P
	Results: no fire, no explosion		P
5	Information for safety		P
	Information is provided to equipment manufacturers in the form of instructions to minimize and mitigate hazards associated with the cells or batteries in accordance with guidelines outlined in informative Annex A.	Information is provided in the instructions.	P
	Information is provided to end-users in the form of instructions to minimize and mitigate hazards associated with the batteries in accordance with guidelines outlined in informative Annex B.	Information is provided in the instructions.	P
6	Marking		P
6.1	Cell marking		P
	Nickel system cells are marked in accordance with IEC 61951-1, -2, IEC 61440, or IEC 61436 as applicable. See Copy of		N



EN 62133			
Clause	Requirement – Test	Result - Remark	Verdict
	Lithium system cells are marked in accordance with IEC 61960. See Copy of Marking Plate item in the beginning of this report.		P
6.2	Battery marking		N
	Batteries of nickel systems are marked in accordance with IEC 61951, or IEC 61951 -2 as applicable. See Copy of Marking Plate item in the beginning of this report		N
	Batteries of lithium system are marked in accordance with IEC 61960. See Copy of Marking Plate item in the beginning of this report.		N
	Batteries are marked with the cautionary marks.		N
6.3	Other information		P
	Disposal instructions are marked on the battery or supplied in the information packaged with the battery.	Supplied in the instruction and marking plate.	P
	Recommended charging instruction are marked on the battery or supplied in the information packaged with the battery.	Supplied in the instruction.	P
7	Packaging		P
	Cells or batteries were provided with packaging that was adequate to avoid mechanical damage during transport, handling and stacking. The materials and pack design was chosen to prevent the development of unintentional electrical conduction, corrosion of the terminal and ingress of moisture.		P
A	ANNEX A, Recommendations to equipment manufacturers and battery assemblers		P
	The following represents a typical, but non-exhaustive, list of good advice to be provided by the manufacturer of secondary cells and batteries to equipment manufacturers and battery assemblers.		P
A. a	Do not dismantle, open or shred cells.		P
A. b	Do not short-circuit a cell or battery		P
A. c	Do not remove a cell or battery from its original packaging until required for use		P
A. d	Do not expose cells or batteries to heat or fire		P
A. e	Do not subject cells or batteries to mechanical shock		P



EN 62133			
Clause	Requirement – Test	Result - Remark	Verdict
A. f	In the event of a cell leaking, do not allow the liquid to come into contact with the skin or eyes		P
A. g	Equipment should be designed to prohibit the incorrect insertion of cells or batteries and should have clear polarity marks.		P
A. h	Do not mix cells of different manufacture, capacity, size or type within a battery		P
A. i	Seek medical advice immediately if a cell or battery has been swallowed		P
A. j	Consult the cell/ battery manufacturer on the maximum number of cells		P
A. k	A dedicated charger should be provided for each equipment.		P
A. l	Keep cells and batteries clean and dry		P
A. m	Wipe the cell or battery terminals with a clean dry cloth if they become dirty		P
A. n	Secondary cells and batteries need to be charged before use		P
A. o	Do not maintain secondary cells and batteries on charge when not in use		P
A. p	After extended periods of storage, it may be necessary to charge and discharge the cells or batteries several times to obtain maximum performance		P
A. q	Secondary cells and batteries give their best performance when they are operated at normal room temperature		P
A. r	Retain the original cell and battery literature for future reference		P
A. s	When disposing of secondary cells or batteries.		P
B	ANNEX B, Recommendations to the end-users		P
	The following represents a typical, but not exhaustive list of good advice to be provided by the equipment manufacturer to the end-user		P
B a)	Do not dismantle, open or shred secondary cells or batteries		P
B b)	Do not expose cells or batteries to heat or fire		P
B c)	Do not short-circuit a cell or a battery		P
B d)	Do not remove a cell or battery from its original packaging until required for use		P

EN 62133			
Clause	Requirement – Test	Result - Remark	Verdict
B e)	Do not subject cells or batteries to mechanical shock		P
B f)	In the event of a cell leaking, do not allow the liquid to come in contact with the skin or eyes		P
B g)	Do not use any charger other than that specifically provided for use with the equipment		P
B h)	Observe the plus(+) and minus (-) marks on the cell		P
B i)	Do not use any cell or battery which is not designed for use with the equipment		P
B j)	Do not mix cells of different manufacture, capacity, size or type within a device		P
B k)	Keep cells and batteries out of the reach of children		P
B l)	Seek medical advice immediately if a cell or a battery has been swallowed		P
B n)	Keep cells and batteries clean and dry		P
B o)	Wipe the cell or battery terminals with a clean dry cloth if they become dirty		P
B p)	Secondary cells and batteries need to be charged before use.		P
B q)	Do not leave a battery on prolonged charge when not in use		P
B r)	After extended periods of storage		P
B s)	Secondary cells and batteries give their best performance when they are operated at normal room temp. (20°C±5°C)		P
B t)	Retain the original product literature for future reference		P
B u)	Use only the cell or battery in the application for which it was intended		P
B v)	When possible, remove the battery from the equipment when not in use		P
B w)	Dispose of properly		P

**Appendix**  
**Tables of Testing Data**

Table 2.1	Insulation resistance Measurements [MΩ]	P
Location	Measured [ MΩ]	Allowed [MΩ]
Between: the positive terminal and externally enclosure wrapped metal foil	>10MΩ	5MΩ

Table 4.2.2	Vibration Test	P
Model	OCV at Start of Test, Vdc	Results
	3.7	A, B
	3.7	A, B
	3.7	A, B
	3.7	A, B
	3.7	A, B
supplementary information: A – No Fire or Explosion B – No Leakage C – Leakage D – Fire E – Explosion F – Bulge G – Other (Please Explain)		

Tabel 4.2.3	TABLE: Moulded case stress	P
Temperature (°C)	Duration	Result
72	7hours	No physical distortion of the battery case resulting in exposure of internal components

Table 4.2.4	TABLE: Temperture cycling	P
Step	contents	Result
1	Place the batteries in an ambient temperature of 75°C for 4h	No fire, no explosion, no leakage
2	Change the ambient temperature to 25°C within 30 min and maintain at this temperature for a minimum of 2h	
3	Change the ambient temperature to -20°C within 30 min and maintain at this temperature for 4h	
4	Change the ambient temperature to -20°C within 30 min and maintain at this temperature for 2h	
5	Repeat steps 1 to 4 for a further four cycles	
6	After the fifth cycle, store the cells or batteries for seven days prior to examination	



TABLE: 4.3.2 External Short Circuit Test					P
Model	Ambient (At 20 °C± 5°C or 55°C± 5 °C)	OCV at start of test, Vdc	Resistance of Circuit,	Maximum Case Temperature Rise $\Delta T$ , °C	Results
	20	3.7	0.011	1	A, B, I
	20	3.7	0.011	1	A, B, I
	20	3.7	0.011	1	A, B, I
	20	3.7	0.011	1	A, B, I
	20	3.7	0.011	1	A, B, I
	55	3.7	0.011	1	A, B, I
	55	3.7	0.011	1	A, B, I
	55	3.7	0.011	1	A, B, I
	55	3.7	0.011	1	A, B, I
	55	3.7	0.011	1	A, B, I

supplementary information:

A – No Fire or Explosion

B – No Leakage

C – Leakage

D – Fire

E – Explosion

F – Bulge

G – The test was completed after 24h

I – The test was completed after the case temperature declined by 20% of the maximum temperature rise.

Table 4.3.3	TABLE: free fall		P
Height	Horizontal surface	Result	
1m	concrete floor	No fire, no explosion	

Table 4.3.4	TABLE: Mechanical shock			P
Average acceleration	Peak acceleration	Time	Result	
80 g <sub>n</sub>	152 g <sub>n</sub>	3milliseconds	No fire, no explosion, no leakage	

Table 4.3.5	TABLE: Thermal abuse		P
Oven temp. (°C)	Time	Result	
130 °C	10 min	No fire, no explosion, no leakage	

Table 4.3.7	TABLE: Low pressure			N
Ambient temp. (°C)	Pressure	Time	Result	

Photos:

Fig 1 Overview

