Test Report issued under the responsibility of:

TÜVRheinland®

TEST REPORT
IEC 62133, First Edition
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......:	**17020972 001**
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CB Testing Laboratory.....:	TÜV Rheinland (Shenzhen) Co., Ltd.
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Applicant's name.....:	JORDAN GREEN TECHNOLOGY (DG) CO., LTD.
Address .....:	No.19, Qigu E. Rd., Chenwu Ind. Zone, Houjie, Dongguan, Guangdong, P.R. China.
Test specification:	
Standard .....:	IEC 62133: 2002 (1st Edition)
Test procedure .....:	CB/CAA
Non-standard test method……..:	N/A
Test Report Form No.....:	IEC62133A
Test Report Form(s) Originator .....:	UL International Demko A/S
Master TRF.....:	Dated 2008-02

If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

Test item description ..... :	Rechargeable LFP Lithium-Ion Cell
Trade Mark .....:	JD
Manufacturer .....:	Same as applicant
Address.....:	Same as applicant
Model/Type reference.....:	JD1384192PP-15
Factory .....:	Same as applicant
Address of the factory.....:	Same as applicant
Ratings.....:	3.2V, 15Ah, 48Wh

Testing procedure and testing location:	
☒ **CB Testing Laboratory:**	TÜV Rheinland (Shenzhen) Co., Ltd.
Testing location/ address.....:	Unit B and C/ 1F, 2nd Building, Shenzhen Cyber-Tech Zone, 7th High-tech South Avenue, High-tech Industrial Park, Shenzhen, Guangdong Province, P.R. China
☐ **Associated CB Test Laboratory:**	
Testing location/ address.....:	
Tested by (name + signature).....:	Sean Pan
Approved by (+ signature) .....:	Daniel Dai
☐ Testing procedure: TMP	
Tested by (name + signature).....:	
Approved by (+ signature) .....:	
Testing location/ address.....:	
☐ Testing procedure: WMT	
Tested by (name + signature).....:	
Witnessed by (+ signature).....:	
Approved by (+ signature) .....:	
Testing location/ address.....:	
☐ Testing procedure: SMT	
Tested by (name + signature).....:	
Approved by (+ signature) .....:	
Supervised by (+ signature).....:	
Testing location/ address.....:	
☐ Testing procedure: RMT	
Tested by (name + signature).....:	
Approved by (+ signature) .....:	
Supervised by (+ signature).....:	
Testing location/ address.....:	

Summary of testing:

Tests performed (name of test and test clause):

4.1 Charging Procedure For Test Purpose
4.2.1 Continuous Low-Rate Charging
4.2.2 Vibration
4.2.4 Temperature Cycling
4.3.2 External Short Circuit
4.3.3 Free Fall
4.3.4 Mechanical Shock (Crash Hazards)
4.3.5 Thermal Abuse
4.3.6 Crush of Cells
4.3.7 Low Pressure
4.3.9 Overcharge for Lithium Systems
4.3.10 Forced Discharge
4.3.11 Cell Protection Against a High Charging Rate (Lithium Systems Only)

Remark:

Tests are made with the number of cells specified in IEC 62133 Table 1.

Testing location:

TÜV Rheinland (Shenzhen) Co., Ltd.

Unit B and C/ 1F, 2nd Building, Shenzhen Cyber-Tech Zone, 7th High-tech South Avenue, High-tech Industrial Park, Shenzhen, Guangdong Province, P.R. China

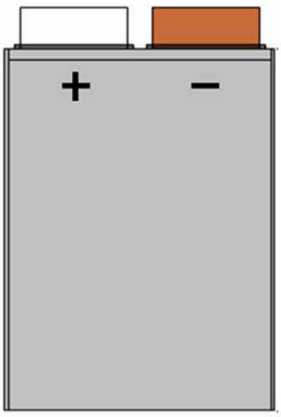
Summary of compliance with National Differences:

AT, DE, DK, FI, FR, HU, KR, NL, SA, SE, SG, TR.

AT=Austria, DE=Germany, DK=Denmark, FI=Finland, FR=France, HU=Hungary, KR=Republic of Korea, NL=The Netherlands, SA=Saudi Arabia, SE=Sweden, SG=Singapore, TR=Turkey.

All national differences of EU group considered according to EN 62133: 2003.

Copy of marking plate:



Test item particulars	:	
Classification of installation and use	:	Class III
Supply Connection	:	DC connector
Cell type	:	JD1384192PP-15
Application	:	Portable
Nominal Voltage	:	3.2V
Rated Capacity	:	15Ah
Recommended charge current	:	3A
Recommended discharge current	:	3A
Max. charge current	:	7.5A
Max. discharge current	:	15A
Electrolyte	:	LiPF6
Dimension(mm)	:	192 mm × 84 mm × 13 mm
Possible test case verdicts:		
- test case does not apply to the test object	:	N/A
- test object does meet the requirement	:	P (Pass)
- test object does not meet the requirement	:	F (Fail)
Testing	:	
Date of receipt of test item	:	June 01, 2011
Date (s) of performance of tests	:	June 13, 2011 - July 13, 2011

General remarks:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
The completed test report includes the attachments (1 page photo document)

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

General product information:

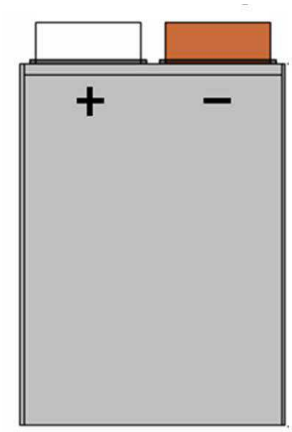
EUT with model name JD1384192PP-15 is a battery cell which in intended for portable use.

Max. dimension: 192 mm × 84 mm × 13 mm
Max. Weight: 450 g

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

Model	Nominal capacity	Nominal voltage	Nominal Charge Current	Nominal Discharge Current	Maximum Charge Current	Maximum Discharge Current	Maximum Charge Voltage	Cut-off Voltage
JD1384192 PP-15	15Ah	3.2V	3A	3A	7.5A	15A	3.75V	2.3V

Construction:



Circuit diagram:

None

IEC 62133:2002			
Cl.	Requirement - Test	Result - Remark	Verdict
1	**General**		P
	Parameter measurement tolerances		P
2	**General Safety Considerations**		P
	Cells and batteries subject to intended use be safe and continue to function in all respects		P
	Cells and batteries subject to reasonably foreseeable misuse do not present significant hazards.		P
2.1	**Insulation and Wiring**		P
	Insulation Resistance between an accessible metal case (excluding electrical contacts) and positive terminals ≥ 5MΩ.	≥ 5MΩ	P
	Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements	No internal wire, see tests of clause 4	N/A
	Orientation of wiring maintains adequate creepage and clearance distances between conductors. Mechanical integrity of internal connections are sufficient to accommodate conditions of reasonably foreseeable misuse.	No internal wire, see tests of clause 4	N/A
2.2	**Venting**	No venting facility incorporated	N/A
	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.		N/A
	Encapsulant used to support cells within an outer casing does not cause the battery to overheat during normal operation no inhibit pressure relief.	To be evaluated in a battery	N/A
2.3	**Temperature/current management**	Cell only	N/A
	The batteries are designed such that abnormal temperature rise conditions are prevented.		N/A
	Means is provided to limit current to safe levels during charge and discharge.		N/A
2.4	**Terminal contacts**		P
	Terminals have a clear polarity marking on the external surface of the battery.	The “+” and “-“ polarity explicitly marked on surface of the cell	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**	Cell only	N/A

IEC 62133:2002			
Cl.	Requirement - Test	Result - Remark	Verdict
	Cells used in the battery assembly have closely matched capacities, are of the same design, and are of the same chemistry and same manufacturer.		N/A
	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/A
2.6	**Quality Plan**		P
	The manufacture has prepared a quality plan defining the procedures for the inspection of materials, components, cells and batteries and which covers the process of producing each type of cell and battery.	Complied	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.	Complied	P
	Unless noted otherwise in the test methods, testing was conducted in an ambient of 20°C ± 5°C.	Tests are carried out at 20°C-25°C.	P
4	**Specific requirements and tests**		P
4.1	**Charging procedure for test purposes**	Test is carried out at 22°C Charging method: CC= 3.0A, CV=3.75V, Cut off current=150mA	P
4.2	**Intended Use**	See below	P
4.2.1	Continuous Low-Rate Charging	CC=3.0A, CV=3.75V, Duration: 28 days	P
	Fully charged cells are subjected for 28 days to a charge as specified by the manufacturer.	See above	P
	Nickel systems: no fire, no explosion	Lithium system	N/A
	Lithium systems: no fire, no explosion, no leakage	See table 4.2.1	P
4.2.2	Vibration		P
	The measured open circuit voltage of the fully charged cells or batteries is within anticipated parameters	Tested complied	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.		P
	The vibration was applied in each of three mutually perpendicular directions.		P
	Results: no fire, no explosion, no leakage	No fire, explosion or leakage	P

IEC 62133:2002			
Cl.	Requirement - Test	Result - Remark	Verdict
4.2.3	Moulded case stress at high ambient temperature	Cell only	N/A
	Fully charged batteries were placed in an air-circulating oven at a temperature of 70°C ± 2°C for 7 hours. Afterwards, they are removed and allowed to return to room temperature.		N/A
	Results: no physical distortion of the battery casing resulting in exposure if internal components.		N/A
4.2.4	Temperature cycling		P
	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.	Tested complied	P
	After the fifth cycle, the cells or batteries were stored for 7 days prior to examination.		P
	Results: No fire, no explosion, no leakage	No fire, explosion or leakage	P
4.3	**Reasonably foreseeable misuse**		P
4.3.1	Incorrect installation of a cell (nickel systems only)	Lithium systems	N/A
	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/A
	Alternatively, a stabilized dc power supply was used t simulate the conditions imposed on the reversed cell.		N/A
	Results: no fire, no explosion		N/A
4.3.2	External short circuit		P
	Fully charged cells or batteries were subjected to a short circuit test at 20°C ± 5°C.	Max. temperature rise 49.6K measured at 25°C	P
	Fully charged cells or batteries were subjected to a short circuit test at 55°C ± 5°C.	Max. temperature rise 27.2K measured at 55°C	P
	The external resistance did not exceed 100 mΩ.	Min. 9 mΩ	P
	The cells or batteries were tested for 24 h or until the case temperature declined by 20% of the maximum temperature rise.	The test terminated till case temperature rise declined 10K at 25°C and 5.4K at 55°C	P
	Results: no fire, no explosion.	No fire or 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.	Tested complied	P
	Results: no fire, no explosion	No fire or explosion	P
4.3.4	Mechanical shock (crash hazard)		P

IEC 62133:2002			
Cl.	Requirement - Test	Result - Remark	Verdict
	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_n. The peak acceleration was between 125 g_n and 175 g_n.	Tested complied	P
	Results: no fire, no explosion, no leakage	No fire, explosion or leakage	P
4.3.5	Thermal abuse		P
	Fully charged cells were placed in a gravity or circulating air-convention oven. The oven temperature was raised at a rate of 5°C/min ± 2°C/min to a temperature of 130°C ± 2°C. The cell remained at that temperature for 10 minutes before the test was discontinued.	Tested complied	P
	Results: no fire, no explosion	No fire or explosion	P
4.3.6	Crushing of cells		P
	Fully charged cells were crushed between two flat surfaces with a hydraulic ram exerting a force of 13 kN ± 1 kN.	Tested complied	P
	A cylindrical or prismatic cell was crushed with its longitudinal axis parallel to the flat surfaces of the crushing apparatus.		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.	No fire or explosion	P
4.3.7	Low pressure		P
	Fully charged cells are placed in a vacuum chamber whose internal pressure was gradually reduced to a pressure equal to or less than 11.6 kPa and held at that value for 6 hours.	Tested complied	P
	Results: no fire, no explosion, no leakage	No fire, explosion or leakage	P
4.3.8	Overcharge for nickel systems	Lithium systems	N/A
	A discharged cell or battery was subjected to a high-rate charge of 2.5 times the recommended charging current for a time that produced a 250% charge input (250% of rated capacity).		N/A
	Results: no fire, no explosion.		N/A
4.3.9	Overcharge for lithium systems		P
	A discharged cell was charged from a power supply of ≥ 10 V, at a charging current I_{rec} recommended by the manufacturer for 2.5 C_5/I_{rec} hours.	10V, 7.5A, 5 hours	P
	Results: no fire, no explosion.	See table 4.3.9	P
4.3.10	Forced discharge		P

IEC 62133:2002			
Cl.	Requirement - Test	Result - Remark	Verdict
	Discharged cells intended for use in multi-cell applications, were subjected to a reverse charge 1t 1.0 I_t (A) for 90 minutes.	Reverse charge = 7.5A	P
	Results: no fire, no explosion	See table 4.3.10	P
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.	7.5A x 3 = 22.5A	P
	Results: no fire, no explosion	See table 4.3.11	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 for safety mentioned in manufacturer's specification.	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 for safety mentioned in manufacturer's specification.	P
6	**Marking**		
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 Marking Plate item in the beginning of this report.	Lithium system	N/A
	Lithium system cells are marked in accordance with IEC 61960. See Copy of Marking Plate item in the beginning of this report.	See page 3	P
6.2	**Battery Marking**	Cell	N/A
	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	Lithium systems.	N/A
	Batteries of lithium system are marked in accordance with IEC 61960. See Copy of Marking Plate item in the beginning of this report.		N/A
	Batteries are marked with the cautionary marks.		N/A
6.3	**Other Information**		P
	Disposal instructions are marked on the battery or supplied in the information packaged with the battery.	Information for disposal instructions mentioned in manufacturer's specification.	P

IEC 62133:2002			
Cl.	Requirement - Test	Result - Remark	Verdict
	Recommended charging instructions are marked on the battery or supplied in the information packaged with the battery.	Information for recommended charging instructions mentioned in manufacturer's specification.	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

IEC 62133:2002			
Cl.	Requirement - Test	Result - Remark	Verdict

2.1 – 2.5	**TABLE: List of Critical Components**				P
Object/part No.	Manufacturer/ trademark	Type/Model	Technical Data	Standard	Marks of Conformity
Aluminum plastic film	SHOWA	Nylon/Aluminum /PP	0.152*160*400mm	--	--
Cathode	Changs	SFCM3005E	2＜D50＜8 Cu＜0.1%	--	--
Anode	HongYuan	F1-20	D50:20±3 C:≧99.2%	--	--
Separator	Celgard	0.025*180mm	Shutdown Temp:133±3℃	--	--
Electrolyte	TianJiao	JDP	H_2O ＜20ppm HF<30ppm	--	--
Conductive Adhesive	HaiYue	F-01	Visccity: 2200-2800 mPa·s	--	--
Insulating tape	SanJing	0.05*12mm/ 0.05*18mm	Width: 12±0.05/18±0.05m m	--	--
Supplementary information:					

IEC 62133:2002			
Cl.	Requirement - Test	Result - Remark	Verdict

	TABLE: 4.2.1 Continuous Low Rate Charge Test (Cell)				P
Model	Recommended Charging Method, CC, CV, or CC/CV	Recommended Charging Voltage Vc, Vdc	Recommended Charging Current Irec, A	OCV at Start of Test, Vdc	Results
#1	CC and CV	3.75	3.0	3.75	P
#2	CC and CV	3.75	3.0	3.75	P
#3	CC and CV	3.75	3.0	3.75	P
#4	CC and CV	3.75	3.0	3.75	P
#5	CC and CV	3.75	3.0	3.75	P
Supplementary information: no fire, explosion or leakage observed					

	TABLE: 4.2.2 – Vibration Test		P
Model	OCV at Start of Test, Vdc	Results	
#1	3.43	P	
#2	3.48	P	
#3	3.41	P	
#4	3.57	P	
#5	3.68	P	
Supplementary information: no fire, explosion or leakage observed			

IEC 62133:2002			
Cl.	Requirement - Test	Result - Remark	Verdict

	TABLE: 4.3.1 – Incorrect Installation of a Cell Test (Nickel Systems)	N/A

Model	OCV (reversed cell) Vdc	Results
Supplementary information: no fire or explosion		

	TABLE: 4.3.2 – External Short Circuit Test				P
Model	Ambient (At 20°C ± 5ºC)	OCV at start of test, Vdc	Resistance of Circuit, Ω	Maximum Case Temperature Rise ΔT, ~~ºC~~	Results
#1	25	3.37	0.011	45.7	P
#2	25	3.38	0.012	49.6	P
#3	25	3.37	0.009	45.6	P
#4	25	3.37	0.010	46.8	P
#5	25	3.34	0.016	40.4	P
	Ambient (At 50°C ± 5ºC)	OCV at start of test, Vdc	Resistance of Circuit, Ω	Maximum Case Temperature Rise ΔT, ~~ºC~~	Results
#1	54.8	3.34	0.015	22.2	P
#2	54.8	3.34	0.017	24.2	P
#3	55.5	3.34	0.015	27.2	P
#4	55.1	3.34	0.013	12.6	P
#5	55.2	3.34	0.012	16.2	P
Supplementary information: no fire or explosion					

IEC 62133:2002			
Cl.	Requirement - Test	Result - Remark	Verdict

	TABLE: 4.3.8 – Overcharge Test (Nickel Systems)			N/A
Model	OCV prior to charging, Vdc	Maximum Charge Current, A	Time for Charging, h	Results
supplementary information: no fire or explosion				

	TABLE: 4.3.9 – Overcharge Tests (Lithium Systems)				P
Model	OCV at start of test, Vdc	Maximum Charging Current, mA	Maximum Charging Voltage, Vdc	Total Time of Charging, h	Results
#1	3.05	7500	10	5	P
#2	3.13	7500	10	5	P
#3	3.16	7500	10	5	P
#4	3.19	7500	10	5	P
#5	3.16	7500	10	5	P
Supplementary information: no fire or explosion					

IEC 62133:2002			
Cl.	Requirement - Test	Result - Remark	Verdict

	TABLE: 4.3.10 – Forced Discharge Test (Cell)				P
Model	OCV before application of reverse charge, Vdc	Measured Reverse Charge It, A	Total Time for Reversed Charge Application, Min	Results	
#1	3.27	15	90	P	
#2	3.29	15	90	P	
#3	3.29	15	90	P	
#4	3.29	15	90	P	
#5	3.26	15	90	P	
Supplementary information: no fire or explosion					

	TABLE: 4.3.11 – Cell Protection Against a High Charging Rate Test (Lithium Systems)				P
Model	OCV at start of test, Vdc	Maximum Charging Current, mA	Maximum Charging Voltage, Vdc	Results	
#1	2.99	22500	3.75	P	
#2	3.01	22500	3.75	P	
#3	3.11	22500	3.75	P	
#4	3.00	22500	3.75	P	
#5	3.10	22500	3.75	P	
Supplementary information: no fire or explosion					

IEC 62133:2002			
Cl.	Requirement - Test	Result - Remark	Verdict

List of test equipment used:

ID #	Equipment	Type	Manufacturer	Date of Calibration	Next Calibration Date
1.903	Hydraulic shock tester	SY10-50	SuZhou DongLing	06/25/2011	06/24/2012
1.905	Battery charger	BK-6008A/20	GuangZhou Blue-key	12/03/2010	12/02/2011
1.908	Electro-dynamic vibration test system	V850-440-LPT600/SPA32K	LDS	06/25/2011	06/24/2012
1.909	Steel ruler(2 m)	2m	ZhengJiang YongKang	08/24/2010	08/23/2011
1.913	Caliper	040204452	Chengdu ChengLiang	09/15/2009	09/14/2011
1.915	Hygro-Thermo graph	7210-00	SATO KEIRYOKI	08/23/2010	08/22/2011
1.916	Hygro-Thermo graph	7210-00	SATO KEIRYOKI	08/23/2010	08/22/2011
1.917	Timer	PC9903	Shenzhen TianFu	10/30/2009	10/29/2011
1.918	Thermal cycling chamber	ESS-KWGD605IIF	YinHe (ChongQing)	09/03/2010	09/02/2011
1.919	Midi logger	GL200A	DATAQ Instruments,	12/07/2010	12/06/2011
1.920	Midi logger	GL200A	DATAQ Instruments,	10/09/2010	10/08/2011
1.921	Oven	SPH201	Guangzhou Espec	10/16/2010	10/15/2011
1.922	Multimeter	F117C	Fluke	10/08/2010	10/07/2011
1.130	DC Low Resistance Tester	JB2512	Changzhou Jiabang	04/26/2011	04/25/2012
83T97	Analytical balance	AL204	Mettler Toledo	04/11/2011	04/10/2012

Type Designation: **JD1384192PP-15**

Report No.: **17020972 001**

Figure 1 Front

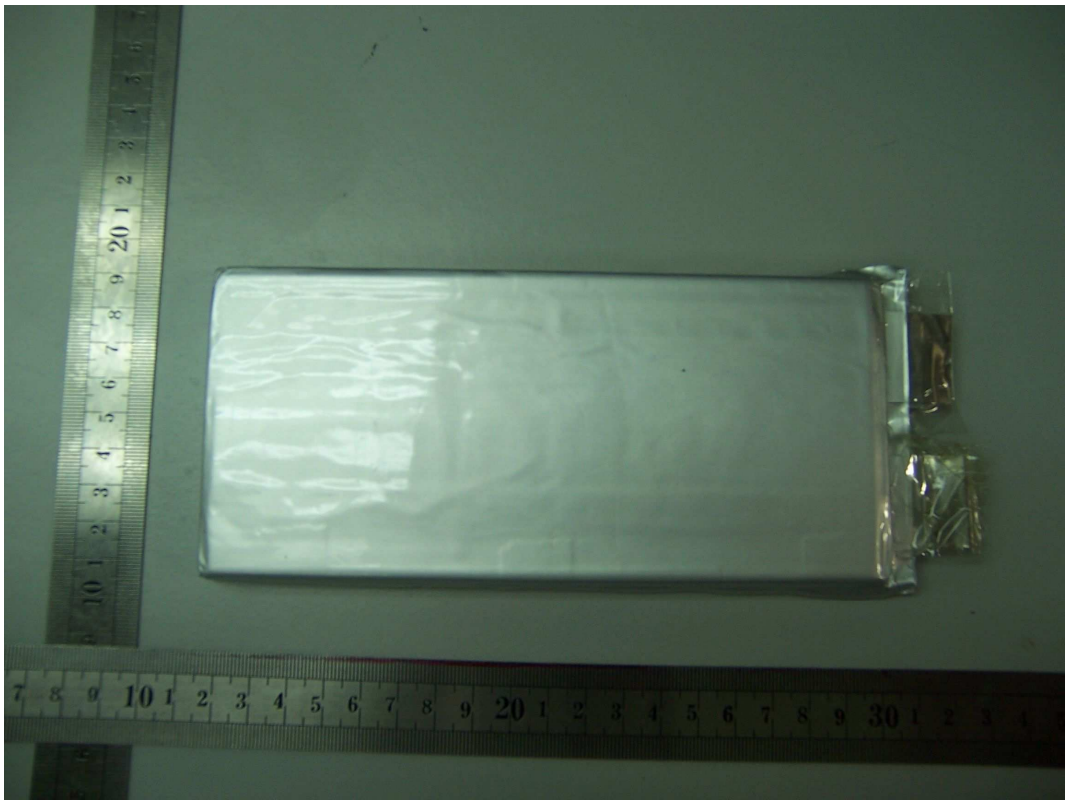


Figure 2 Rear