





APPLICATION FOR LOW VOLTAGE DIRECTIVE TEST REPORT On Behalf of SHENZHEN FBTECH CO., LTD Ni-MH BATTERY

Model:AA2200 1.2V, AA2100 1.2V, AA2000 1.2V, AA1900 1.2V, AA1850 1.2V

Prepared For : SHENZHEN FBTECH CO., LTD

NO.8 Tongfuyu industrial Zone Kukeng, Guanlan Town, Bao'

an District, Shenzhen, Guangdong, China

Prepared By : Shenzhen Anbotek Compliance Laboratory

Limited

East of 4/F., Building A, Hourui No.3 Industrial Zone, Xixiang Street, Bao' an District, Shenzhen, Guangdong,

China

Tel: (86)755-26066061 Fax: (86)755-26066021

Date of Test: Apr. 29, 2016 to May. 31, 2016

Date of Report: Apr. 29, 2016

Report Number: R0116041136S-1



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TEST REPORT

EN 62133: 2013

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...... R0116041136S-1

Compiled by (+ signature).....: Vinson Wu / Project Engineer

Approved by (+ signature)...... Mark Zhu / Project Manager

Date of issue.....: May. 31, 2016

Contents...... 25 pages(including 5 pages of photo)

Testing laboratory

Name...... Shenzhen Anbotek Compliance Laboratory Limited

Address..... East of 4/F., Building A, Hourui No.3 Industrial Zone, Xixiang

Street, Bao' an District, Shenzhen, Guangdong, China

Testing location..... Shenzhen Anbotek Compliance Laboratory Limited

Client

Name...... SHENZHEN FBTECH CO., LTD

District, Shenzhen, Guangdong, China

Test specification

Standard.....: EN 62133: 2013

Test procedure Compliance with EN 62133: 2013

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

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

Test item

Description...... Ni-MH BATTERY

Trademark....: N.A.

Model and/or type reference...... AA2200 1.2V, AA2100 1.2V, AA2000 1.2V, AA1900 1.2V,

AA1850 1.2V

Serial number...... N.A.

Manufacturer..... SHENZHEN FBTECH CO., LTD

Address...... NO.8 Tongfuyu industrial Zone Kukeng, Guanlan Town, Bao' an

District, Shenzhen, Guangdong, China

Rating(s)..... DC 1.2V

Particulars: test item vs. test requirements



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Ambient temperature : 20 °C ± 5 °C.

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 Apr. 29, 2016

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.

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

Comments:

- The maximum ambient temperature is 45℃.
- 2. If no otherwise specified, all tests performed at the model: AA2200 1.2V
- Details information for the cell of model AA2200 1.2V

Nominal voltage: 1.2V Rated capacity:2200mAh Standard charge current:220mA End of discharge voltage: 1.0V

Dimension(D*H): Diameter:14.52mm, Height:49.75mm

Weight: Approx 28.349g

Copy of marking:

NI-MH BATTERY

" Model: AA2200 1.2V Rating: DC 1.2V, 2200mAh "- "







To dispose of property.

Do not incinerate or expose to fire.

Made In China

SHENZHEN FBTECH CO., LTD



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		or 25 Report No. Ru 1100	
	EN 62133: 2013		
Clause	Requirement – Test	Result - Remark	Verdict
4	Parameter measurement tolerances		
	Parameter measurement tolerances		Р
			1
5	General safety considerations		
5.1	General		Р
5.2	Insulation and wiring		
	The insulation resistance between the positive terminal and externally exposed metal surfaces of the battery (excluding electrical contact surfaces) is not less than 5 $M\Omega$		P
	Insulation resistance (MΩ)		N
	Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements		N
	Orientation of wiring maintains adequate creepage and clearance distances between conductors		N
	Mechanical integrity of internal connections accommodates reasonably foreseeable misuse		N
5.3	Venting		
	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
	Encapsulation used to support cells within an outer casing does not cause the battery to overheat during normal operation nor inhibit pressure relief		Р
5.4	Temperature/voltage/current management		
	Batteries are designed such that abnormal temperature rise conditions are prevented		N
	Batteries are designed to be within temperature, voltage and current limits specified by the cell manufacturer		N
	Batteries are provided with specifications and charging instructions for equipment manufacturers so that associated chargers are designed to maintain charging within the temperature, voltage and current limits specified		N
5.5	Terminal contacts		



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Clause	Requirement – Test	Result - Remark	Verdict
	Terminals have a clear polarity marking on the external surface of the battery		Р
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current		Р
	External terminal contact surfaces are formed from conductive materials with good mechanical strength and corrosion resistance		Р
	Terminal contacts are arranged to minimize the risk of short circuits		Р
5.6	Assembly of cells into batteries		
5.6.1	If there is more than one battery housed in a single battery case, cells used in the assembly of each battery have closely matched capacities, be of the same design, be of the same chemistry and be from the same manufacturer		N
	Each battery has an independent control and protection		N
	Manufacturers of cells make recommendations about current, voltage and temperature limits so that the battery manufacturer/designer may ensure proper design and assembly		N
	Batteries that are designed for the selective discharge of a portion of their series connected cells incorporate separate circuitry to prevent the cell reversal caused by uneven discharges		N
	Protective circuit components are added as appropriate and consideration given to the end-device application		N
	When testing a battery, the manufacturer of the battery provides a test report confirming the compliance according to this standard		N
5.6.2	Design recommendation for lithium systems only		
	For the battery consisting of a single cell or a single cellblock: - Charging voltage of the cell does not exceed the upper limit of the charging voltage specified in Clause 8.1.2, Table 4; or		N
	- Charging voltage of the cell does not exceed the different upper limit of the charging voltage determined through Clause 8.1.2, NOTE 1.		N



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	EN 62133: 2013		
Clause	Requirement – Test	Result - Remark	Verdict
	For the battery consisting of series-connected plural single cells or series-connected plural cellblocks: - The voltages of any one of the single cells or single cellblocks does not exceed the upper limit of the charging voltage, specified in Clause 8.1.2, Table 4, by monitoring the voltage of every single cell or the single cellblocks; or		N
	- The voltages of any one of the single cells or single cellblocks does not exceed the different upper limit of the charging voltage, determined through Clause 8.1.2, NOTE 1, by monitoring the voltage of every single cell or the single cellblocks		N
	For the battery consisting of series-connected plural single cells or series-connected plural cellblocks: - Charging is stopped when the upper limit of the charging voltage, specified in Clause 8.1.2, Table 4, is exceeded for any one of the single cells or single cellblocks by measuring the voltage of every single cell or the single cellblocks; or		N
	- Charging is stopped when the upper limit of the different charging voltage, determined through Clause 8.1.2, NOTE 1, is exceeded for any one of the single cells or single cellblocks by measuring the voltage of every single cell or the single cellblocks		N
5.7	Quality plan		
	The manufacturer prepares and implements 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		Р
6	Type test conditions Tests were made with the number of cells or	According to Table 2 of the	 P
	batteries specified in Table 1 for nickel-cadmium and nickel-metal hydride systems and Table 2 for lithium systems, using cells or batteries that are not more than six months old	standard. Less than six months	
	Unless noted otherwise in the test methods, testing was conducted in an ambient of 20°C \pm 5°C.	The tests are conducted in an ambient of 20°C ±5°C	Р
7	Specific requirements and tests (nickel systems)		



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EN 62133: 2013				
Clause	Requirement – Test Result - Remark		Verdict	
7.1	Charging procedure for test purposes		Р	
7.2	Intended use			
7.2.1	Continuous low-rate charging (cells)			
7.2.1	Results: No fire. No explosion		P	
7.2.2	Vibration			
7.2.2	Results: No fire. No explosion. No leakage		Р	
7.2.3	Moulded case stress at high ambient temperature			
7.2.5	Oven temperature (°C)		N	
		•	N	
	Results: No physical distortion of the battery casing resulting in exposure if internal components		"	
7.2.4	Temperature cycling			
	Results: No fire. No explosion. No leakage.		Р	
7.3	Reasonably foreseeable misuse			
7.3.1	Incorrect installation cell			
	The test was carried out using: - Four fully charged cells of the same brand, type, size and age connected in series, with one of them reversed; or		Р	
	- A stabilized dc power supply.		Р	
	Results: No fire. No explosion:		Р	
7.3.2	External short circuit			
	The cells or batteries were tested until one of the following occurred: - 24 hours elapsed; or		Р	
	- The case temperature declined by 20% of the maximum temperature rise		Р	
1	Results: No fire. No explosion:		Р	
7.3.3	Free fall			
	Results: No fire. No explosion.		Р	
7.3.4	Mechanical shock (crash hazard)			
	Results: No fire. No explosion. No leakage.		Р	
7.3.5	Thermal abuse			
	Oven temperature (°C)		Р	
	Results: No fire. No explosion.		Р	
7.3.6	Crushing of cells			



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	EN 62133: 2013		
Clause	Requirement – Test	Result - Remark	Verdict
	The condition for a second second second		Р
	The crushing force was released upon: - The maximum force of 13 kN \pm 1 kN has been applied; or		'
	- An abrupt voltage drop of one-third of the original voltage has been obtained		Р
	The cell is prismatic type and a second set of samples was tested, rotated 90° around longitudinal axis compared to the first set		Р
	Results: No fire. No explosion		Р
7.3.7	Low pressure		
	Chamber pressure (kPa)		Р
	Results: No fire. No explosion. No leakage.		Р
7.3.8	Overcharge	(See Table 7.3.8)	
	Results: No fire. No explosion		Р
	No fire, no explosion.		Р
7.3.9	Forced discharge		
	Results: No fire. No explosion		Р
8	Specific requirements and tests (lithium system	s)	
8.1	Charging procedures for test purposes		
8.1.1	First procedure: This charging procedure applied to tests other than those specified in 8.1.2		N
8.1.2	Second procedure: This charging procedure applied to the tests of 8.3.1, 8.3.2, 8.3.4, 8.3.5, and 8.3.9		
	If a cell's specified upper and/or lower charging temperature exceeds values for the upper and/or lower limit test temperatures of Table 4, the cells were charged at the specified values plus 5 °C for the upper limit and minus 5 °C for the lower limit		N
	A valid rationale was provided to ensure the safety of the cell (see Figure A.1)		N
	For a different upper limit charging voltage (i.e. other than for lithium cobalt oxide systems at 4,25 V), the applied upper limit charging voltage and upper limit charging temperatures were adjusted accordingly		N



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	EN 62133: 2013		
Clause	Requirement – Test	Result - Remark	Verdict
		T	
	A valid rationale was provided to ensure the safety of the cell (see Figure A.1)		N
8.2	Intended use		
8.2.1	Continuous charging at constant voltage (cells)		
	Results: No fire. No explosion		N
8.2.2	Moulded case stress at high ambient temperature (battery)		
	Oven temperature (°C)		N
	Results: No physical distortion of the battery casing resulting in exposure if internal components		N
8.3	Reasonably foreseeable misuse		
8.3.1	External short circuit (cell)		
	The cells were tested until one of the following occurred: - 24 hours elapsed; or		N
	- The case temperature declined by 20% of the maximum temperature rise		N
	Results: No fire. No explosion		N
8.3.2	External short circuit (battery)		
	The cells were tested until one of the following occurred: - 24 hours elapsed; or		N
	- The case temperature declined by 20% of the maximum temperature rise		N
	In case of rapid decline in short circuit current, the battery pack remained on test for an additional one hour after the current reached a low end steady state condition		N
	Results: No fire. No explosion		N
8.3.3	Free fall		
	Results: No fire. No explosion.		N
8.3.4	Thermal abuse (cells)		
	The cells were held at 130°C ± 2°C for: - 10 minutes; or		N
	- 30 minutes for large cells (gross mass of more than 500 g as defined in IEC 62281)		N
	Oven temperature (°C)		N



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	EN 62133: 2013		
Clause	Requirement – Test	Result - Remark	Verdict
			l NI
	Gross mass of cell (g)		N
	Results: No fire. No explosion.		N
8.3.5	Crush (cells)		
	The crushing force was released upon: - The maximum force of 13 kN \pm 1 kN has been applied; or		N
	- An abrupt voltage drop of one-third of the original voltage has been obtained; or		N
	- 10% of deformation has occurred compared to the initial dimension		N
	Results: No fire. No explosion	(See Table 8.3.5)	N
8.3.6	Over-charging of battery		—
	Test was continued until the temperature of the outer casing: - Reached steady state conditions (less than 10°C change in 30-minute period); or		N
	- Returned to ambient		N
	Results: No fire. No explosion		N
8.3.7	Forced discharge (cells)		
	Results: No fire. No explosion		N
8.3.8	Transport tests		
	Manufacturer's documentation provided to show compliance with UN Recommendations on Transport of Dangerous Goods		N
8.3.9	Design evaluation – Forced internal short circuit (cells)		
	The cells complied with national requirement for		N
	The pressing was stopped upon: - A voltage drop of 50 mV has been detected; or		N
	- The pressing force of 800 N (cylindrical cells) or 400 N (prismatic cells) has been reached		N
	Results: No fire		N
		•	
9	Information for safety		
	The manufacturer of secondary cells ensures that information is provided about current, voltage and temperature limits of their products.		Р



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	EN 62133: 2013		
Clause	Requirement – Test	Result - Remark	Verdict
	The manufacturer of batteries ensures that equipment manufacturers and, in the case of direct sales, end-users are provided with information to minimize and mitigate hazards.		Р
	Systems analyses performed by device manufacturers to ensure that a particular battery design prevents hazards from occurring during use of a product		Р
	As appropriate, information relating to hazard avoidance resulting from a system analysis is provided to the end user		Р
10	Marking		-
10.1	Cell marking		
	Cells marked as specified in the applicable cell standards: IEC 61951-1, IEC 61951-2 or IEC 61960.		Р
10.2	Battery marking		
	Batteries marked in accordance with the requirements for the cells from which they are assembled.		N
	Batteries marked with an appropriate caution statement.		N
10.3	Other information		
	Storage and disposal instructions marked on or supplied with the battery.		N
	Recommended charging instructions marked on or supplied with the battery.		N
		T	
11	Packaging		
	The materials and packaging design are chosen so as to prevent the development of unintentional electrical conduction, corrosion of the terminals and ingress of environmental contaminants.		N
Annex A	Charging range of secondary lithium ion cells fo	or safe use	
A.1	General		N
A.2	Safety of lithium-ion secondary battery		N
A.3	Consideration on charging voltage		



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	EN 62133: 2013		
Clause	Requirement – Test	Result - Remark	Verdict
A.3.1	General		N
A.3.2	Upper limit charging voltage		
A.3.2.1	General		N
A.3.2.2	Explanation of safety viewpoint		N
A.3.2.3	Safety requirements, when different upper limit charging voltage is applied		N
A.4	Consideration of temperature and charging current		
A.4.1	General		N
A.4.2	Recommended temperature range		
A.4.2.1	General		N
A.4.2.2	Safety consideration when a different recommended temperature range is applied		N
A.4.3	High temperature range		
A.4.3.1	General		N
A.4.3.2	Explanation of safety viewpoint		N
A.4.3.3	Safety considerations when specifying charging conditions in high temperature range		N
A.4.3.4	Safety consideration when specifying new upper limit in high temperature range		N
A.4.4	Low temperature range		
A.4.4.1	General		N
A.4.4.2	Explanation of safety viewpoint		N
A.4.4.3	Safety considerations, when specifying charging conditions in low temperature range		N
A.4.4.4	Safety considerations when specifying a new lower limit in the low temperature range		N
A.4.5	Scope of the application of charging current		N
A.5	Sample preparation		
A.5.1	General		N
A.5.2	Insertion procedure for nickel particle to generate internal short		N
	The insertion procedure carried out at 20°C±5°C and under -25 °C of dew point		N
A.5.3	Disassembly of charged cell		N
A.5.4	Shape of nickel particle		N



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	EN 62133: 2013				
Clause	Clause Requirement – Test Result - Remark				
A.5.5	Insertion of nickel particle to cylindrical cell		N		
A.5.5.1	Insertion of nickel particle to winding core		N		
A.5.5.2	Mark the position of nickel particle on the both end of winding core of the separator		N		
A.5.6	Insertion of nickel particle to prismatic cell		N		



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TABLE: List of critical components					Р
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity ¹)
Cell	SHENZHEN FBTECH CO., LTD	AA2200 1.2V	DC 1.2V, 2200mAh	EN 62133: 2013	Test with appliance
1) An asteris	k indicates a mark which as	sures the agree	ed level of surveilla	nce.	1

7.2.1	TABL	E: Continuous low-r	Р		
Sample No. Recommended Charging Voltage Vc, Vdc Recommended Charging Current Irec, mA		OCV at start of Test, Vdc	Results		
C01			220	1.436	
C02			220	1.440	No fine no
C03			220	1.442	No fire, no explosion, no
C04			220	1.433	leakage.
C05			220	1.442	

Note(s): Test time is 28 days.

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7.2.2	TABLE: Vibration	Р		
Sample No.	Vibration time (minute)	OCV at Start of Test, Vdc	Visual examination result	
Cells				
C06	90*3	1.442		
C07	90*3	1.435		
C08	90*3	1.441	No fire, no explosion, n	o leakage
C09	90*3	1.437		
C10	90*3	1.441		

Note(s): 1. The vibration is applied in each of three mutually perpendicular directions.

2. Rest cell or batteries for 1 h, then make a visual inspection.

7.2.3	TABLE: Moulded case stress at high ambient temperature N						
Sample No.	OCV at Start of Test, Vdc	Temperature(°ℂ)	Result				
		70±2	No physical distortion of the battery case resulting in exposure of internal components.				
		70±2					
		70±2					
Note(s): Test ti	Note(s): Test time is 7 hours.						



Tables

7.2.4	TABLE: Temperature	Р		
Sample No.	OCV at Start of Test, Vdc	Temperature(°ℂ)	Result	
Cells				
C11	1.440	(–20 ℃, +75 ℃)		
C12	1.436	(–20 ℃, +75 ℃)		
C13	1.442	(–20 ℃, +75 ℃)	No fire, no explosion, no	leakage.
C14	1.447	(–20 ℃, +75 ℃)		
C15	1.432	(–20 ℃, +75 ℃)		
Note(s):				

7.3.1	TABLE: Inco	ABLE: Incorrect Installation of a Cell Test (Nickel Systems)				
Sma	ple No.	OCV (reversed cell) Vdc		Result		
		-				
				-		
	-	-				
		1				
		_				
Note (s):						

7.3.2 TABLE	E: -External sho	rt circuit			P
Sample No.	Ambient temperature, (°C)	OCV at start of test, (Vdc)	Resistance of circuit, (mΩ)	Maximum case temperature rise ΔT, (°C)	Results
C16	20 ±5	1.433	80 ±20	66.4	
C17	20 ±5	1.431	80 ±20	58.6	
C18	20 ±5	1.442	80 ±20	59.2	No fire, no explosion.
C19	20 ±5	1.437	80 ±20	63.4	·
C20	20 ±5	1.445	80 ±20	61.8	
C21	55 ±5	1.431	80 ±20	80.1	No fire, no
C22	55 ±5	1.433	80 ±20	81.5	explosion.



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C23	55 ±5	1.446	80 ±20	78.1	
C24	55 ±5	1.432	80 ±20	82.1	
C25	55 ±5	1.443	80 ±20	75.1	
Note (s):					

7.3.3	TABLE:	TABLE: Free fall P						
Sample No.		OCV at start of test, Vdc Drop height (m)		Result				
Cells								
C26		1.447	1.0	No fire, no explosion.				
C27		1.443		No fire, no explosion.				
C2	8	1.444	1.0	No fire, no explosion.				
Note (s): Ea	ch sample	e dropped for 3 times.						

7.3.4	TABLE:	ABLE: Mechanical shock (crash hazard)				
Sampl	e No.	OCV at start of test, Vdc	Result			
C2	29	1.442				
C3	30	1.441				
C3	31	1.437	No fire, no explosion, no leakage.			
C32		1.434				
C3	33	1.436				
Note (s):						

7.3.5	TABLE:	Thermal abuse				Р
Sample	No.	OCV at start of test, Vdc	Ambient temperature, (°C)	Temperature raised at a rate(°C/min)		Result
C34	1	1.447	130±2	5±2	No fire,	no explosion
C35	5	1.436	130±2	5±2	No fire,	no explosion
C36	3	1.443	130±2	5±2	No fire,	no explosion
C37	7	1.441	130±2	5±2	No fire,	no explosion
C38	3	1.437	130±2	5±2	No fire,	no explosion



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Note (s):

7.3.6 TABLE: Crushing of cells					
Sample	nple No. OCV at start of test, Vdc a hydraulic ram exerting a force Result				
C39		1.441	$13 \text{ KN} \pm 1 \text{ KN}$		
C40		1.447	13 KN ± 1 KN		
C41		1.435	13 KN ± 1 KN	No fire, no explosio	n.
C42		1.443	13 KN ± 1 KN		
C43		1.442	13 KN ± 1 KN		
Note (s):					

7.3.7	TABLE:	Low pressure			Р	
Sample	e No.	OCV at start of test, Vdc	Pressure	Result		
C4	4	1.432	≤11.6KPa	No fire, no explosion, no leakage.		
C4	5	1.437	≤11.6KPa	No fire, no explosion, no leakage.		
C4	C46 1.431 ≤11.6KPa No fire, no explosion, no leakage.			eakage.		
Note (s): Te	Note (s): Test time is 6 hours.					

7.3.8	.3.8 TABLE: Overcharge for nicke systems					
Sample	e No.	Prior to charging, Vdc (V)	Maximum Charge Current, mA	Time for Charging,(h)		Result
C4	7	1.145	220	12.5		
C4	8	1.144	220	12.5		
C4:	9	1.157	220	12.5	No fire,	no explosion.
C5	0	1.148	220	12.5		
C5	1	1.156	220	12.5]	
Note (s):						



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4.3.9	TABLE:	Forced discharge				Р
Sample No.		Reverse Charge current 1 It A	Before reverse charge, Vdc	OCV after Test, Vdc	Result	
C52		2200mA	1.147	0.00	No fire, no explosion.	
C53		2200mA	1.141	0.00	No fire, no explosion.	
C54		2200mA	1.142	0.00	No fire, no explosion.	
C55		2200mA	1.142	0.00	No fire, no explosion.	
C56		2200mA	1.146	0.00	No fire, no explosion.	
Note (s): Test time is 1.5 hours.						





























