



Test Report issued under the responsibility of:



**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 Number: BA-4786501076-A-1

Date of issue: 2014-07-30

Total number of pages: 20

Applicant's name.....: Sony Taiwan Ltd.

Address: 5th Fl, 145 Changchun Rd, Taipei, Taiwan

Test specification:

Standard: IEC 62133: 2012 (Second Edition)

Test procedure: CB Scheme

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

Test Report Form No.....: IEC62133B

Test Report Form(s) Originator: UL(Demko)

Master TRF.....: Dated 2013-03

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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 Lithium-ion Cylindrical Cell

Trade Mark: Sony

Manufacturer.....: Sony Energy Devices Corp.
1-1 SHIMOSUGISHITA TAKAKURA HIWADA-MACHI,
KORIYAMA-SHI FUKUSHIMA 963-0531 JAPAN

Model/Type reference: US14500VR2

Ratings: 3.6±0.6 Vdc ,
Nominal Capacity: 715 mAh, Rated Capacity: 680 mAh

Testing procedure and testing location:		
<input checked="" type="checkbox"/>	CB Testing Laboratory:	Underwriters Laboratories Taiwan Co., Ltd.
Testing location/ address :		260 Da-Yeh Road 112 Peitou Taipei City, Chinese Taipei
<input type="checkbox"/>	Associated CB Testing Laboratory:	
Testing location/ address :		
Tested by (name + signature) :		Dora Lin
		<i>Dora Lin.</i>
Approved by (name + signature) :		Percy Shih
		<i>Percy Shih</i>
<hr/>		
<input type="checkbox"/>	Testing procedure: TMP	
Testing location/ address :		
Tested by (name + signature) :		
Approved by (name + signature) :		
<hr/>		
<input type="checkbox"/>	Testing procedure: WMT	
Testing location/ address :		
Tested by (name + signature) :		
Witnessed by (name + signature) :		
Approved by (name + signature) :		
<hr/>		
<input type="checkbox"/>	Testing procedure: SMT	
Testing location/ address :		
Tested by (name + signature) :		
Approved by (name + signature) :		
Supervised by (name + signature) .. :		

List of Attachments (including a total number of pages in each attachment):	
National Differences (0 pages) Enclosures (4 pages)	
Summary of testing:	
Tests performed (name of test and test clause):	Testing location:
<ul style="list-style-type: none"> - 8.2.1 Continuous charge - 8.3.1 External short circuit - 8.3.3 Free fall - 8.3.4 Thermal abuse - 8.3.5 Crush - 8.3.7 Forced Discharge 	Underwriters Laboratories Taiwan Co., Ltd. 260 Da-Yeh Road 112 Peitou Taipei City, Chinese Taipei
Summary of compliance with National Differences	
List of countries addressed: N/A	
No National Differences or Group Differences for EN 62133: 2013.	
Copy of marking plate	
The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.	
N/A - The cells will be used in the manufacture of battery pack only.	

Test item particulars.....:	
Classification of installation and use.....:	N/A
Supply connection.....:	N/A
Recommend charging method declared by the manufacturer	CC/CV
Discharge current (0,2 I_t A)	143 mA
Specified final voltage.....:	3 V
Chemistry	<input type="checkbox"/> nickel systems <input checked="" type="checkbox"/> lithium systems
Recommend of charging limit for lithium system	
Upper limit charging voltage per cell.....:	4.25 Vdc
Maximum charging current	2000 mA
Charging temperature upper limit	65 degree C
Charging temperature lower limit.....:	0 degree C
Polymer cell electrolyte type	<input type="checkbox"/> gel polymer <input type="checkbox"/> solid polymer
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	2010-12-23; 2014-07-16
Date (s) of performance of tests	2010-12-28 to 2011-01-28; 2014-07-16 to 2014-07-24
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. "(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report.	
Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC60080-1:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Not applicable
When differences exist; they shall be identified in the General product information section.	

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

1. SONY ENERGY DEVICES CORP KORIYAMA PLANT.
1-1 SHIMOSUGISHITA.TAKAKURA HIWADA-MACHI.
KORIYAMA-SHI.FUKUSHIMA.963-0531 JAPAN.
2. SONY ENERGY DEVICES CORP.
TOCHIGI PLANT
1724 SHIMOTSUBOYAMA SHIMOTSUKE-SHI
TOCHIGI-KEN 323-0192 JAPAN
3. SONY ELECTRONICS (SINGAPORE) PTE LTD
1 TUAS RD, SINGAPORE 638481, SINGAPORE.

General product information:

- Rechargeable Lithium-ion Cylindrical Cell. (There is a steel case consists of Positive Electrode, Negative Electrode, Separator and Electrolyte.)
- The product was investigated to the following additional Standard for EN 62133: 2013.
- This cell is also approved by UL1642.
- The cells will be used in the manufacture of battery pack only.
- This report is a reissue of CBTR Ref. No.BA-10CA65691-A-1 issued on 2011-01-31, CB Test Certificate Ref. No.DK-21768 issued on 2011-02-02, and Ref. No.BA-10CA65691-A-1 Amendment 1 issued on 2012-07-27, CB Test Certificate Ref. No. DK-21768-A1-UL issued date on 2012-07-30,
- This Report was reissued due to :
 1. Upgrade of standard to IEC 62133 2nd / EN 62133:2013
 Based on previously conducted testing and the review of product construction, only
 - 8.3.1 External short circuit
 - 8.3.4 Thermal abuse
 - 8.3.5 Crush
 were deemed necessary.

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
4	Parameter measurement tolerances		
	Parameter measurement tolerances		Pass
5	General safety considerations		
5.1	General		Pass
5.2	Insulation and wiring	Considered in battery pack.	N/A
	The insulation resistance between the positive terminal and externally exposed metal surfaces of the battery (excluding electrical contact surfaces) is not less than 5 MΩ		N/A
	Insulation resistance (MΩ) :		—
	Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements		N/A
	Orientation of wiring maintains adequate creepage and clearance distances between conductors		N/A
	Mechanical integrity of internal connections accommodates reasonably foreseeable misuse		N/A
5.3	Venting		Pass
	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	Cell incorporates with venting mechanism.	Pass
	Encapsulation used to support cells within an outer casing does not cause the battery to overheat during normal operation nor inhibit pressure relief	Considered in battery pack.	N/A
5.4	Temperature/voltage/current management	Considered in battery pack.	N/A
	Batteries are designed such that abnormal temperature rise conditions are prevented		N/A
	Batteries are designed to be within temperature, voltage and current limits specified by the cell manufacturer		N/A
	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/A
5.5	Terminal contacts	Considered in battery pack.	N/A
	Terminals have a clear polarity marking on the external surface of the battery		N/A
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current		N/A

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
	External terminal contact surfaces are formed from conductive materials with good mechanical strength and corrosion resistance		N/A
	Terminal contacts are arranged to minimize the risk of short circuits		N/A
5.6	Assembly of cells into batteries		Pass
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	Considered in battery pack.	N/A
	Each battery has an independent control and protection		N/A
	Manufacturers of cells make recommendations about current, voltage and temperature limits so that the battery manufacturer/designer may ensure proper design and assembly		N/A
	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/A
	Protective circuit components are added as appropriate and consideration given to the end-device application	Considered in end device.	N/A
	When testing a battery, the manufacturer of the battery provides a test report confirming the compliance according to this standard		N/A
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	Considered in battery pack.	N/A
	- 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/A
	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/A

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
	- 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/A
	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/A
	- 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/A
5.7	Quality plan		Pass
	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	ISO 9001 Certificate provided.	Pass
6	Type test conditions		
	Tests were made with the number of cells or 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		Pass
	Unless noted otherwise in the test methods, testing was conducted in an ambient of 20°C ± 5°C.		Pass
7	Specific requirements and tests (nickel systems)		
7.1	Charging procedure for test purposes	Not nickel system cells.	N/A
7.2	Intended use		N/A
7.2.1	Continuous low-rate charging (cells)		N/A
	Results: No fire. No explosion		N/A
7.2.2	Vibration		N/A
	Results: No fire. No explosion. No leakage		N/A
7.2.3	Moulded case stress at high ambient temperature		N/A
	Oven temperature (°C)		—
	Results: No physical distortion of the battery casing resulting in exposure if internal components		N/A

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
7.2.4	Temperature cycling		N/A
	Results: No fire. No explosion. No leakage.		N/A
7.3	Reasonably foreseeable misuse		N/A
7.3.1	Incorrect installation cell		N/A
	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		N/A
	- A stabilized dc power supply.		N/A
	Results: No fire. No explosion..... :		N/A
7.3.2	External short circuit		N/A
	The cells or batteries were tested until one of the following occurred: - 24 hours elapsed; or		N/A
	- The case temperature declined by 20% of the maximum temperature rise		N/A
	Results: No fire. No explosion..... :		N/A
7.3.3	Free fall		N/A
	Results: No fire. No explosion.		N/A
7.3.4	Mechanical shock (crash hazard)		N/A
	Results: No fire. No explosion. No leakage.		N/A
7.3.5	Thermal abuse		N/A
	Oven temperature (°C)..... :		—
	Results: No fire. No explosion.		N/A
7.3.6	Crushing of cells		N/A
	The crushing force was released upon: - The maximum force of 13 kN ± 1 kN has been applied; or		N/A
	- An abrupt voltage drop of one-third of the original voltage has been obtained		N/A
	The cell is prismatic type and a second set of samples was tested, rotated 90° around longitudinal axis compared to the first set		N/A
	Results: No fire. No explosion..... :		N/A
7.3.7	Low pressure		N/A
	Chamber pressure (kPa)..... :		—
	Results: No fire. No explosion. No leakage.		N/A
7.3.8	Overcharge		N/A

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
	Results: No fire. No explosion..... :		N/A
7.3.9	Forced discharge		N/A
	Results: No fire. No explosion..... :		N/A
8	Specific requirements and tests (lithium systems)		
8.1	Charging procedures for test purposes		Pass
8.1.1	First procedure: This charging procedure applied to tests other than those specified in 8.1.2	Applied to the tests of 8.2.1, 8.3.3, 8.3.7 (8.3.8). Charged with 4.2 V, 680 mA, cut off current 34 mA.	Pass
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	Applied to the tests of 8.3.1, 8.3.4, 8.3.5, (8.3.9).	Pass
	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	Sample charging temperature: 4.25 Vdc at 70 and -5 degree C.	Pass
	A valid rationale was provided to ensure the safety of the cell (see Figure A.1)	Sample charging temperature: 4.25 Vdc at 70 and -5 degree C.	Pass
	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	Upper voltage value was used: 4.25 V	Pass
	A valid rationale was provided to ensure the safety of the cell (see Figure A.1)		Pass
8.2	Intended use		Pass
8.2.1	Continuous charging at constant voltage (cells)		Pass
	Results: No fire. No explosion..... :	See Table 8.2.1.	Pass
8.2.2	Moulded case stress at high ambient temperature (battery)	Considered in battery pack.	N/A
	Oven temperature (°C)		—
	Results: No physical distortion of the battery casing resulting in exposure if internal components		N/A
8.3	Reasonably foreseeable misuse		Pass
8.3.1	External short circuit (cell)		Pass
	The cells were tested until one of the following occurred: - 24 hours elapsed; or		N/A

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
	- The case temperature declined by 20% of the maximum temperature rise		Pass
	Results: No fire. No explosion..... :	See Table 8.3.1.	Pass
8.3.2	External short circuit (battery)	Considered in battery pack.	N/A
	The cells were tested until one of the following occurred: - 24 hours elapsed; or		N/A
	- The case temperature declined by 20% of the maximum temperature rise		N/A
	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/A
	Results: No fire. No explosion..... :		N/A
8.3.3	Free fall	Cells were subjected to this test.	Pass
	Results: No fire. No explosion.	No fire. No explosion.	Pass
8.3.4	Thermal abuse (cells)		Pass
	The cells were held at 130°C ± 2°C for: - 10 minutes; or		Pass
	- 30 minutes for large cells (gross mass of more than 500 g as defined in IEC 62281)	Cell weight is not larger than 500 g	N/A
	Oven temperature (°C)		—
	Gross mass of cell (g)		—
	Results: No fire. No explosion.	No fire and no explosion.	Pass
8.3.5	Crush (cells)		Pass
	The crushing force was released upon: - The maximum force of 13 kN ± 1 kN has been applied; or		Pass
	- An abrupt voltage drop of one-third of the original voltage has been obtained; or		N/A
	- 10% of deformation has occurred compared to the initial dimension		N/A
	Results: No fire. No explosion..... :	No fire and no explosion.	Pass
8.3.6	Over-charging of battery	Considered in battery pack.	N/A
	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/A
	- Returned to ambient		N/A

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
	Results: No fire. No explosion..... :		N/A
8.3.7	Forced discharge (cells)		Pass
	Results: No fire. No explosion..... :	See Table 8.3.7	Pass
8.3.8	Transport tests		Pass
	Manufacturer's documentation provided to show compliance with UN Recommendations on Transport of Dangerous Goods	UN 38.3 test report was provided.	Pass
8.3.9	Design evaluation – Forced internal short circuit (cells)		Pass
	The cells complied with national requirement for :		—
	The pressing was stopped upon: - A voltage drop of 50 mV has been detected; or		N/A
	- The pressing force of 800 N (cylindrical cells) or 400 N (prismatic cells) has been reached		Pass
	Results: No fire :	See Table 8.3.9	Pass
9	Information for safety		
	The manufacturer of secondary cells ensures that information is provided about current, voltage and temperature limits of their products.	Supplied in Instruction as described in Enclosure ID 02.	Pass
	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.	Considered in battery pack.	N/A
	Systems analyses performed by device manufacturers to ensure that a particular battery design prevents hazards from occurring during use of a product	Considered in end device.	N/A
	As appropriate, information relating to hazard avoidance resulting from a system analysis is provided to the end user :	Considered in end device.	N/A
10	Marking		
10.1	Cell marking		Pass
	Cells marked as specified in the applicable cell standards: IEC 61951-1, IEC 61951-2 or IEC 61960.	The cells will be used in the manufacture of battery pack only.	Pass
10.2	Battery marking		N/A
	Batteries marked in accordance with the requirements for the cells from which they are assembled.	Considered in battery pack.	N/A

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
	Batteries marked with an appropriate caution statement.		N/A
10.3	Other information	Considered in battery pack.	N/A
	Storage and disposal instructions marked on or supplied with the battery.		N/A
	Recommended charging instructions marked on or supplied with the battery.		N/A

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.	Supplied Instruction as described in Enclosure ID 03.	Pass

Annex A	Charging range of secondary lithium ion cells for safe use		
A.1	General		Pass
A.2	Safety of lithium-ion secondary battery		Pass
A.3	Consideration on charging voltage		Pass
A.3.1	General		Pass
A.3.2	Upper limit charging voltage	Upper limit charging voltage is 4.25 Vdc	Pass
A.3.2.1	General		Pass
A.3.2.2	Explanation of safety viewpoint		Pass
A.3.2.3	Safety requirements, when different upper limit charging voltage is applied	See test results of 8.3.1, 8.3.4, 8.3.5, (8.3.9)..	Pass
A.4	Consideration of temperature and charging current		Pass
A.4.1	General		Pass
A.4.2	Recommended temperature range		Pass
A.4.2.1	General	Temperature limits are 65 degree C and 0 degree C	Pass
A.4.2.2	Safety consideration when a different recommended temperature range is applied		Pass
A.4.3	High temperature range		Pass
A.4.3.1	General		Pass
A.4.3.2	Explanation of safety viewpoint		Pass
A.4.3.3	Safety considerations when specifying charging conditions in high temperature range		N/A
A.4.3.4	Safety consideration when specifying new upper limit in high temperature range	See test results of 8.3.1, 8.3.4, 8.3.5, (8.3.9).	Pass

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
A.4.4	Low temperature range		Pass
A.4.4.1	General		Pass
A.4.4.2	Explanation of safety viewpoint		Pass
A.4.4.3	Safety considerations, when specifying charging conditions in low temperature range		N/A
A.4.4.4	Safety considerations when specifying a new lower limit in the low temperature range	See test results of 8.3.1, 8.3.4, 8.3.5, (8.3.9).	Pass
A.4.5	Scope of the application of charging current		N/A
A.5	Sample preparation		Pass
A.5.1	General		Pass
A.5.2	Insertion procedure for nickel particle to generate internal short		Pass
	The insertion procedure carried out at 20°C±5°C and under -25 °C of dew point		Pass
A.5.3	Disassembly of charged cell		Pass
A.5.4	Shape of nickel particle		Pass
A.5.5	Insertion of nickel particle to cylindrical cell		Pass
A.5.5.1	Insertion of nickel particle to winding core		Pass
A.5.5.2	Mark the position of nickel particle on the both end of winding core of the separator		Pass
A.5.6	Insertion of nickel particle to prismatic cell		Pass

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE: Critical components information					Pass
Object/part no.	Manufacturer/ trademark	Type/model	Technical data	Standard	Mark(s) of conformity 1)
01. Cell Case	Interchangeable	Interchangeable	Steel or Stainless, Ni plated optional. Overall cell dimension measured diameter 14.0+/- 0.15 mm, length 49.1+/-0.2 mm.	--	--
02. Positive Electrode	Interchangeable	Interchangeable	Lithium Transition Metal Oxide	--	--
03. Negative Electrode	Interchangeable	Interchangeable	Graphite	--	--
04. Electrolyte	Interchangeable	Interchangeable	Organic Solvent / Lithium Salt	--	--
05. Separator	Interchangeable	Interchangeable	Polyethylene	--	--
06. Insulations	Interchangeable	Interchangeable	Polypropylene or/and Polyphenylene Sulfide or/and Polyethylene Terephthalate or/and Polyester or/and polyimide	--	--
Supplementary information:					
N/A					

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

8.2.1	TABLE: Continuous charging at constant voltage (cells)				Pass
Model	Recommended charging voltage V_c , (Vdc)	Recommended charging current I_{rec} , (mA)	OCV at start of test, (Vdc)	Results	
US14500VR2	4.2	680	4.20	A, B	
US14500VR2	4.2	680	4.20	A, B	
US14500VR2	4.2	680	4.20	A, B	
US14500VR2	4.2	680	4.20	A, B	
US14500VR2	4.2	680	4.20	A, B	

Supplementary information:

- A: No fire or explosion
- B: No leakage
- C: Leakage
- D: Fire
- E: Explosion
- F: Bulge
- G: Others (please explain)

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

8.3.1	TABLE: External short circuit (cell)					Pass
Model	Ambient, (°C)	OCV at start of test, (Vdc)	Resistance of circuit, (mΩ)	Maximum case temperature rise ΔT, (°C)	Results	
Samples charged at charging temperature upper limit: 70 °C						
US14500VR2	24.5	4.2445	84.90	53.0	A, G	
US14500VR2	24.5	4.2395	83.40	54.5	A, G	
US14500VR2	24.5	4.2360	81.24	53.7	A, G	
US14500VR2	24.5	4.2330	84.28	51.1	A, G	
US14500VR2	24.5	4.2250	81.88	51.2	A, G	
Samples charged at charging temperature lower limit: -5 °C						
US14500VR2	24.5	4.1460	84.20	53.1	A, G	
US14500VR2	24.5	4.1450	86.25	52.5	A, G	
US14500VR2	24.5	4.2470	81.21	54.5	A, G	
US14500VR2	24.5	4.1450	83.44	53.2	A, G	
US14500VR2	24.5	4.2475	82.46	53.2	A, G	
Supplementary information:						
<ul style="list-style-type: none"> - A: No fire or explosion - B: No leakage - C: Leakage - D: Fire - E: Explosion - F: Bulge - G: Others (please explain) The cells were tested until case temperature declined by 20% of the maximum temperature rise. 						

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

8.3.5	TABLE: Crush					Pass
Model	OCV at start of test, (Vdc)	OCV at removal of crushing force, (Vdc)	Width/ diameter of cell before crush, (mm)	Required deformation for crush, (mm)	Results	
Samples charged at charging temperature upper limit: 70 °C						
US14500VR2	4.2345	--	--	--	A, B, G	
US14500VR2	4.1350	--	--	--	A, B, G	
US14500VR2	4.2400	--	--	--	A, B, G	
US14500VR2	4.2385	--	--	--	A, B, G	
US14500VR2	4.2395	--	--	--	A, B, G	
Samples charged at charging temperature lower limit: -5 °C						
US14500VR2	4.2340	--	--	--	A, B, G	
US14500VR2	4.2365	--	--	--	A, B, G	
US14500VR2	4.2385	--	--	--	A, B, G	
US14500VR2	4.2400	--	--	--	A, B, G	
US14500VR2	4.2435	--	--	--	A, B, G	
Supplementary information:						
<ul style="list-style-type: none"> - A: No fire or explosion - B: No leakage - C: Leakage - D: Fire - E: Explosion - F: Bulge - G: Others (please explain) Force released after maximum level reached 						

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

8.3.7	TABLE: Forced discharge (cells)				Pass
Model	OCV before application of reverse charge, (Vdc)	Measured Reverse charge I_t , (A)	Time for reversed charge, (minutes)	Results	
US14500VR2	3.0	0.715	90	A	
US14500VR2	3.0	0.715	90	A	
US14500VR2	3.0	0.715	90	A	
US14500VR2	3.0	0.715	90	A	
US14500VR2	3.0	0.715	90	A	
Supplementary information:					
<ul style="list-style-type: none"> - A: No fire or explosion - B: No leakage - C: Leakage - D: Fire - E: Explosion - F: Bulge - G: Others (please explain) 					

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

8.3.9	TABLE: Forced internal short circuit (cells)					Pass
Model	Chamber ambient, (°C)	OCV at start of test, (Vdc)	Particle location	Maximum applied pressure, (N)	Results	
Samples charged at charging temperature upper limit: 70 °C						
US14500VR2	45.0	4.237	1	804	A, B	
US14500VR2	45.0	4.233	1	804	A, B	
US14500VR2	45.0	4.237	1	812	A, B	
US14500VR2	45.0	4.239	1	807	A, B	
US14500VR2	45.0	4.240	1	808	A, B	
Samples charged at charging temperature lower limit: -5 °C						
US14500VR2	10.0	4.143	1	808	A, B	
US14500VR2	10.0	4.139	1	808	A, B	
US14500VR2	10.0	4.143	1	803	A, B	
US14500VR2	10.0	4.144	1	806	A, B	
US14500VR2	10.0	4.146	1	808	A, B	
<p>Supplementary information: Identify one of the following: 1: Nickel particle inserted between positive and negative (active material) coated area. 2: Nickel particle inserted between positive aluminium foil and negative active material coated area.</p> <p>- A:No fire or explosion - B:No leakage - C:Leakage - D:Fire - E:Explosion - F:Bulge - G:Others (please explain):</p> <p>Test data was provided by Client, not CBTL.</p>						

ENCLOSURE

Supplement Id	Description
01	Overview of Rechargeable Lithium-ion Cylindrical Cell, Model US14500VR2
02	Safety Information for Rechargeable Lithium-ion Cylindrical Cell, Model US14500VR2
03	Packaging Drawing for Rechargeable Lithium-ion Cylindrical Cell, Model US14500VR2

ID 01

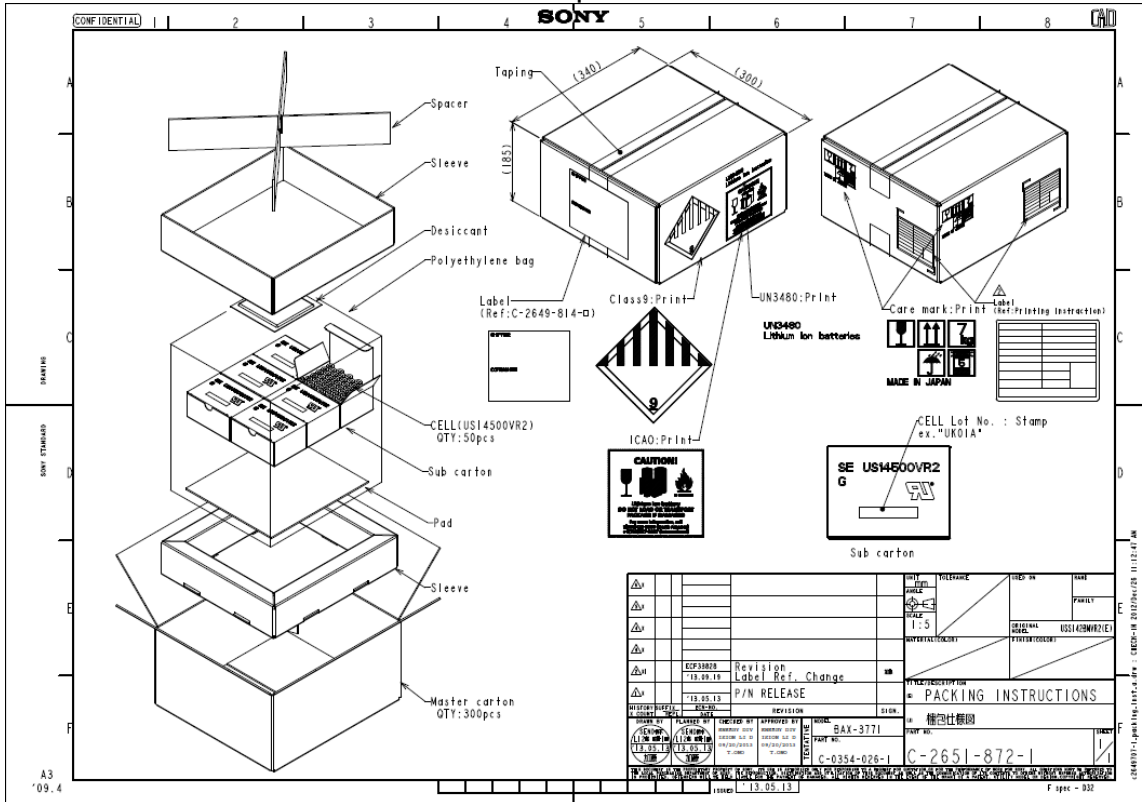


ID 02

Caution

- *Do not throw cells into fire, nor excessively heat the cells.
- *Do not disassemble cells.
- *Do not store or use the cell at high temperature ambient environments. (60°C or more)
- *Protect the cell from exposure to water or moisture.
- *Do not expose the cell to shock or drop.
- *Do not solder lead directly to the cell.
- *Do not short (+) and (-) terminal of the cell with metal.
- *Do not charge beyond the condition which described on this cell specification.
- *Do not reverse charge the cell.
- *Do not mix cells with cells of another type.
- *Do not penetrate the cell with a nail etc., nor make a hole in the cell.
- *Do not put the cell into a microwave oven, nor high pressure container.
- *Do not connect the cell to wall sockets nor cigarette wall sockets in the vehicle, etc.

ID 03 Air Transportation



Boat Transportation

