

納入仕様書

Product Specifications

貴社名 : ELENTEC CO. , LTD.
Customer's name _____

貴社部品名 :
Customer's parts name _____

貴社部品番号 : * * * * *
Customer's parts number _____

ソニー部品名 : Cell Type: US424188H5 SY6
SONY parts name _____

ソニー部品番号 : 49938610
1-853-480-11
SONY parts number _____

All items written on approval sheet should be checked regularly and managed during mass production.

承認 Approved by	確認 Checked by	作成 Prepared by

変更履歴 History of revisions				
変更年月日 Date		変更事項 Description	承認 Approved by	作成 Prepared by
	' 14.11.20	First issue		
	' 15.05.13	Apply to ver2.2. Added Key Material Related Information.		

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Lithium-Ion Polymer Rechargeable Battery Specifications

1 Scope

This specification is applicable to Lithium-Ion Polymer Rechargeable Battery.

All items written on approval sheet should be checked regularly and managed during mass production.

2 Product Categories and Model Name

2.1 Product Category	Lithium Ion Polymer Rechargeable Battery
2.2 Customer's parts name	
2.3 Sony parts name	49938610, 1-853-480-11
2.4 Cell type	US424188H5

3 Rating

Item		Rating	Note
3.1	Minimum capacity	2300mAh	Discharge: 0.2ItA (460mA) cut off Voltage : 2.75V for cell
3.2	Cut Off Voltage	2.75V	
3.3	Nominal Voltage	3.80V	Typical value
3.4	Charge Current	1.0ItA	Maximum
3.5	Charge Voltage	4.35V	
3.6	Maximum Charge Voltage	4.40V	
3.7	Charge cut-off	0.02ItA	
3.8	Maximum Charge Current for Cycles	1.0ItA	
3.9	Maximum Charge Current	1.0ItA	Continuous
3.10	Maximum Discharge Current	2.0ItA	Continuous
3.11	Weight	38.0g or less	
3.12	Operating Temperature	Charge -5 to 55℃	
		Discharge -20 to 60℃,	
3.13	Storage Temperature	1 year -20 to 25℃	If the cell is kept as ex-factory status (3.90V~4.05V of Charge state),the capacity recovery rate is more than 80%
		3 Month -20 to 45℃	
		1 Month -20 to 60℃	
3.14	Recommended Temperature	Storage 23℃	at the shipment state

4 Shape/Dimension and Appearance

4.1 Shape/Dimension

As shown in Dimensional Outline Drawing.

Width : 40.50 \pm 0.30mm. (Measured with weighting 600gf at 23°C)

Total length : 87.00 \pm 0.50mm. (Not including tabs)

Thickness (Full charged State) : 4.14 \pm 0.10 mm. (Measured with weighting 600gf at 23°C)

Thickness (Shipping State) : 4.11 \pm 0.10 mm. (Measured with weighting 600gf at 23°C)

4.2 Appearance

There shall be no remarkable scratches, stains, deformation, or leakage that could affect quality or reliability.

Any uncertainty arising out of this phrase shall be settled upon consultation between both parties.

5 Performance

5.1 Standard Test Condition

Test condition shall be at 23°C and 65 \pm 20% R.H. However, it can be at 15~30°C and 25~85% R.H. as long as there is no doubt. The humidity can be any condition unless it affects the test results.

5.2 Testing Instrument or Apparatus

5.2.1 Dimension Measuring Instrument

The dimension measurement shall be implemented by instruments with equal or more precision scale of 0.01mm specified by JIS B 7502(outside micrometer) or JIS B 7503(dial gauge).

5.2.2 Voltmeter and Ammeter

Voltmeters and ammeters shall be equal or more precision instruments specified by JIS C 1102. (Indication Electric Instrument Level 0.5)

5.2.3 Impedance Meter

Impedance shall be measured by a sinusoidal alternating current method (1 kHz LCR meter).

5.3 Standard Charge

Standard Charging is defined as charging at a constant voltage of 4.35V and a constant current of 460mA until current decreased to 46mA.

5.4 Standard Discharge

Discharging at a constant current of 460mA achieve to 2.75V in 23°C atmosphere.

5.5 Electrical Performance

Item		Condition	Specification																	
5.5.1 Open-Circuit Voltage		Open Circuit Voltage at Outgoing.	3.99+0.06/-0.09V																	
5.5.2 Internal Impedance		After Standard Charging, within 3 days (1kHz).	35 ± 10mΩ																	
5.5.3 Battery Capacity 1		The capacity on standard discharge shall be measured after standard charge at 23℃	2300mAh or more																	
5.5.4 Battery Capacity 2		The capacity on 0.5ItA (1150mA) discharge achieve to 2.75V shall be measured after standard charge at 23℃.	2254mAh or more																	
5.5.5 Battery Capacity 3		The capacity on 1ItA (2300mA) discharge achieve to 2.75V shall be measured after standard charge at 23℃.	2070mAh or more																	
5.5.6 Discharging Temperature characteristic		The capacity shall be measured after standard charge and discharge at the temperature shown in the following table.	More than the value in the left table.																	
		<table><tr><th rowspan="2">Charge temperature</th><th colspan="5">Discharge temperature</th></tr><tr><th>-20℃</th><th>-10℃</th><th>0℃</th><th>23℃</th><th>55℃</th></tr><tr><td>23℃</td><td>690mAh</td><td>1380mAh</td><td>1840mAh</td><td>2300mAh</td><td>2300mAh</td></tr></table>	Charge temperature	Discharge temperature					-20℃	-10℃	0℃	23℃	55℃	23℃	690mAh	1380mAh	1840mAh	2300mAh	2300mAh	
		Charge temperature		Discharge temperature																
			-20℃	-10℃	0℃	23℃	55℃													
23℃	690mAh	1380mAh	1840mAh	2300mAh	2300mAh															
5.5.7 Storage characteristic 1	1	The capacity on standard discharge shall be measured after standard charge and then storage at 23℃ for 28 days.	1955mAh or more (Remaining capacity)																	
	2	After above measured Remaining capacity, the capacity on standard discharge shall be measured after standard charge.	2070mAh or more (Recovery capacity)																	
5.5.8 Storage characteristic 2		The test sample shall be stored at 40±2℃ for 90 days after standard charging. After the storage, the capacity on standard discharge shall be measured after re-charge (standard charge).	1150mAh or more																	
5.5.9 Long term storage characteristic		The test samples shall be storage at 23℃ for 365days after standard charging. After the storage, the capacity on standard discharge shall be measured after re-charge (standard charge).	1840mAh or more																	
5.5.10 High temperature and High humidity storage		The OCV, impedance and thickness shall be measured after standard charge and then storage at 60±2℃and 90% R.H. for 14 days. The cell shall be measured at both 7th day and 14th day, after cells were cooled at 23℃ for 6hour.	Appearance: No crack, No twist, No separation in molding, No leakage, No fire. The difference between the data of 7th day and 14th day shall be as below, △V: not more than 0.2V △R: not more than 20mΩ T: not more than 4.579mm																	

“*” is reference Value

Item	Condition	Specification																								
5.5.11 Charge/Discharge Cycle 1	<p>Charge at a constant voltage of 4.35V and a constant current of 1.0ItA(2300mA) for 0.1ItA(230mA), Discharge at 1.0ItA(2300mA), cut-off voltage is 3.00V.</p> <p>The capacity checking shall be done every 50 cycles with Condition as “Battery Capacity 1”.</p> <table><tr><td></td><td colspan="5">Life cycle Criteria</td></tr><tr><td>Cycle counts</td><td>100</td><td>200</td><td>300</td><td>400</td><td>500</td></tr><tr><td>Capacity</td><td>2070 mAh</td><td>2024 mAh</td><td>1955 mAh</td><td>1909 mAh</td><td>1840 mAh</td></tr><tr><td>Cell thickness</td><td>4.452 mm</td><td>4.494 mm</td><td>4.536 mm</td><td>4.558 mm</td><td>4.579 mm</td></tr></table>		Life cycle Criteria					Cycle counts	100	200	300	400	500	Capacity	2070 mAh	2024 mAh	1955 mAh	1909 mAh	1840 mAh	Cell thickness	4.452 mm	4.494 mm	4.536 mm	4.558 mm	4.579 mm	Capacity more than, and Thickness less than the value in the left table.
	Life cycle Criteria																									
Cycle counts	100	200	300	400	500																					
Capacity	2070 mAh	2024 mAh	1955 mAh	1909 mAh	1840 mAh																					
Cell thickness	4.452 mm	4.494 mm	4.536 mm	4.558 mm	4.579 mm																					
5.5.12 Charge/Discharge Cycle 2	<p>Charge at a constant voltage of 4.35V and a constant current of 1.0ItA(2300mA) for 0.1ItA(230mA), Discharge at 1.0ItA(2300mA), cut-off voltage is 3.00V at 45°C.</p> <p>The capacity checking shall be done every 50 cycles with Condition as “Battery Capacity 1” at 45°C.</p> <table><tr><td></td><td colspan="3">Life cycle Criteria</td></tr><tr><td>Cycle counts</td><td>100</td><td>200</td><td>300</td></tr><tr><td>Capacity</td><td>2070mAh</td><td>1955mAh</td><td>1840mAh</td></tr><tr><td>Cell thickness</td><td>4.452mm</td><td>4.536mm</td><td>4.579mm</td></tr></table> <p>The thickness shall be measured after cells were cooled at 23°C for 6hour.</p>		Life cycle Criteria			Cycle counts	100	200	300	Capacity	2070mAh	1955mAh	1840mAh	Cell thickness	4.452mm	4.536mm	4.579mm	Capacity more than, and Thickness less than the value in the left table.								
	Life cycle Criteria																									
Cycle counts	100	200	300																							
Capacity	2070mAh	1955mAh	1840mAh																							
Cell thickness	4.452mm	4.536mm	4.579mm																							

“*” is reference Value

5.6 Mechanical Performance

Item	Condition	Specification
5.6.1 Thermal Shock Test	After 4.25V Charging, 85°C2h ←5min→ -40°C2h, for 20 Cycles.	Appearance: No crack, No twist, No separation in molding, No leakage, No fire. ΔV: not more than 0.2V ΔR: not more than 20mΩ T: not more than 4.579mm
5.6.2 Vibration Test	After Standard charging, Vibration is to be applied. Amplitude: 0.8mm(1.6mm total maximum excursion) Frequency: vary at the rate of 1 hertz per minute between 10 and 55 hertz. Test time: not less than 90 nor more than 100 minutes Direction: x, y, z	No leakage or remarkable defective appearance.

5.7 Safety Performance

Safety Performance is conformable to UL1642.

Item	Condition	Specification
5.7.1 Short between terminal	The battery shall be standard charged. Then its terminal shall be shorted and discharge at 55°C for 1hour.	No explosion No smoke
5.7.2 Forced Discharge	The battery shall be standard charged. Discharge continuously the cell with constant current 1ItA for 2.5 hours.	No leakage
5.7.3 Overcharge	The battery shall be standard charged. Then it shall be charged for 7 hours using 4.6V/3ItA power supply.	No explosion No smoke
5.7.4 Penetration	The battery shall be standard charged. Penetrate completely center of cell with 3mm diameter nail at the velocity of 150mm/sec.	No explosion No smoke
5.7.5 Vibration	The battery shall be standard charged. Conduct the test by Vibration Test Condition(5.6.2).	No leakage
5.7.6 Impact	The battery shall be standard charged. A 20pound(9.1kg) weight is to be dropped from a height of 24±1 inch (610±25mm) onto the bar and cells.	No explosion No smoke
5.7.7 Crush	The battery shall be standard charged. Cell(rated charged) is placed between two flat surfaces and a force of 13 ± 1 kN shall be applied by a crushing apparatus. The force shall be released when the following occurs: there is 10% deformation of the battery height.	No explosion No smoke
5.7.8 Thermal Shock	The battery shall be standard charged. Stand for 2 hour at -40°C, and then stand for 2hour at 85°C. : transfer time between each step is within 5 minutes. Repeat 20 times.	No leakage, No Fire, Heated < 200°C
5.7.9 Hot Box Test	The battery shall be standard charged. Left in the oven and heated at 5deg.C/min up to 130deg.C and keep for 1 hour.	No explosion No smoke
5.7.10 Projectile	The battery shall be standard charged. The samples are to be heated and shall remain on the screen until it explodes or the cell has ignited and burned out.	No part of an exploding cell penetrate or protrude the wire screen.
5.7.11 Triangular Rod Crush	The battery shall be standard charged. Applied force of 3kN±10N to the test samples by triangular rod.	No explosion No smoke
5.7.12 Pouch Type Cell High Temperature Internal Force Test	The battery shall be standard charged. The battery is loaded on JIG. JIG thickness - 4.664mm JIG width - 41.00mm After attachment, storage 90deg.C and keep for 8 hours.	No leakage

5.8 Material Specification(separator)

Material	Thickness (μm)	Tensile Strength (MPa)	Puncture Strength (N)
separator	7	39 or more	1.5 or more
Al laminated film	76	-	-

6 Lot Number (Manufacturing Date of Cells)

The last 5 letters and figures of the code mean the manufacturing year, month and date. Each of the letters and figures stand for:

Ex.) $\frac{\bigcirc}{Y}$ $\frac{\bigcirc}{M}$ $\frac{\bigcirc\bigcirc}{DD}$ $\frac{\bigcirc}{\text{Electrode history or shift lot}}$

Y: Supposing the year '92 as A, Every next year is counted as B, C,...

(Using an Alphabet letter)

M: Supposing January as A, the consecutive month as B, C,...

(Using an Alphabet letter)

D: Exact Date

(Using a figure)

Electrode history or shift lot: A,B,C,.....

(Using an Alphabet letter)

7 Delivery condition

Approx. 70% charged

8 Inspection items, methods and criteria

Test	Test Condition	Quantity	Criteria
Life Cycle (Cell)	*23°C 500Cycle *Charge 0.8C, 0.1C Cut-off *Discharge 1.0C 3.4V Cut-off	3EA (month)	*More than 80% of Initial Capacity *Less than 8% of guarantee thickness(4.579mm)
Acceleration Life Cycle (Cell)	*45°C, 300Cycle *Charge 0.8C, 0.1C Cut-off *Discharge 1.0C 3.4V Cut-off	3EA (2week)	*More than 80% of Initial Capacity *Less than 8% of guarantee thickness(4.579mm)
PL Safety Test (Cell)	*Triangular Rod Crush, Crush, Impact, Heating, Penetration, Overcharge, External Shortage	5EA (Each Lot)	*According to PL Safety Test
High Temperature Storage (Cell)	*Full Charge *60°C, 90% 14day	5EA (Each Lot)	*Less than 8% of guarantee thickness(4.579mm)
Thermal Shock (Cell)	*4.25V Charge *-40°C(2Hr) ~ 85°C(2Hr) 20Cycle	5EA (Each Lot)	*Less than 8% of guarantee thickness(4.579mm)

9 Caution

Caution on usage of Lithium Ion Polymer Rechargeable Battery.

9.1 Handling at assembly

- 1) In case of adding strong shock to battery or dropping battery, do not use the battery.
- 2) In case of distorting battery, do not use the battery.
- 3) To prevent from ESD under appropriate work environment and by workers.
- 4) In case of using adhesive tape or glue on Li-ion polymer battery, not remove the adhesive tape or glue after sticking on battery pack.
- 5) In case of making a crack or dent to the laminate portion of battery do not use the battery.

9.2 Design of battery pack

- 1) It shall be the shape which cannot be connected easily to any charger other than the dedicated charger.
- 2) It shall have the structure which cannot be easily for end users to apply for the other purpose.
- 3) It shall have the terminals or function which cannot easily cause external short circuit (such as chain short by necklace).
- 4) It shall not be short easily by effects of vibration or drop due to contact of internal wiring materials (i.e. tab, lead wire) to battery.
- 5) It should be prevented to place the battery near by any object which may endanger the battery. (ex; Metal edge. Thin plastic. Electrical part on PWB)
- 6) Protective circuit
The battery must possess three types of protective circuits as follows.
 - Over-charging protective circuit
The over-charging protective circuit shall operate at less than 4.4volts.
 - Over-discharging protective circuit
The over-discharging protective circuit shall operate at 2.7 to 2.9 volts, then the discharge current must decrease to less than 10 micro amperes.
 - Excessive-current protective circuit
The protective circuit must operate at charging or discharging at over 3 C current.
- 7) The battery pack must have 2'nd protection of over-charging.
- 8) The battery pack must have dark-current protective design.
- 9) The battery pack circuit has function of illegal zero voltage charge.
- 10) Do not short positive and negative polarity of cell Aluminum laminate.

9.3 Storage

- 1) It shall be kept in shipping condition (approx.70% charged) or discharged condition to storage for long period.
- 2) It shall be kept in dry condition of low humidity, especially be free from high temperature.
- 3) Do not storage the battery near heat sources, nor in a place subject to direct sunlight to storage in warehouse.

10 Prohibition Clause

- 1) Do not throw the battery into fire, nor heat the battery.
- 2) Do not disassemble nor modify the battery.
- 3) Do not leave the battery in a place of high temperature. (60°C or more)
- 4) To prevent the battery from water or moisture.
- 5) Do not add strong shock, nor drop the battery.
- 6) Do not solder lead directly to the battery body.
- 7) Do not heat nor solder the terminals of the battery.
- 8) Do not short + and - terminal of the battery with a kind of metal.
- 9) Do not charge beyond the condition which described on the delivery specification.
- 10) Do not inverse charge the battery.

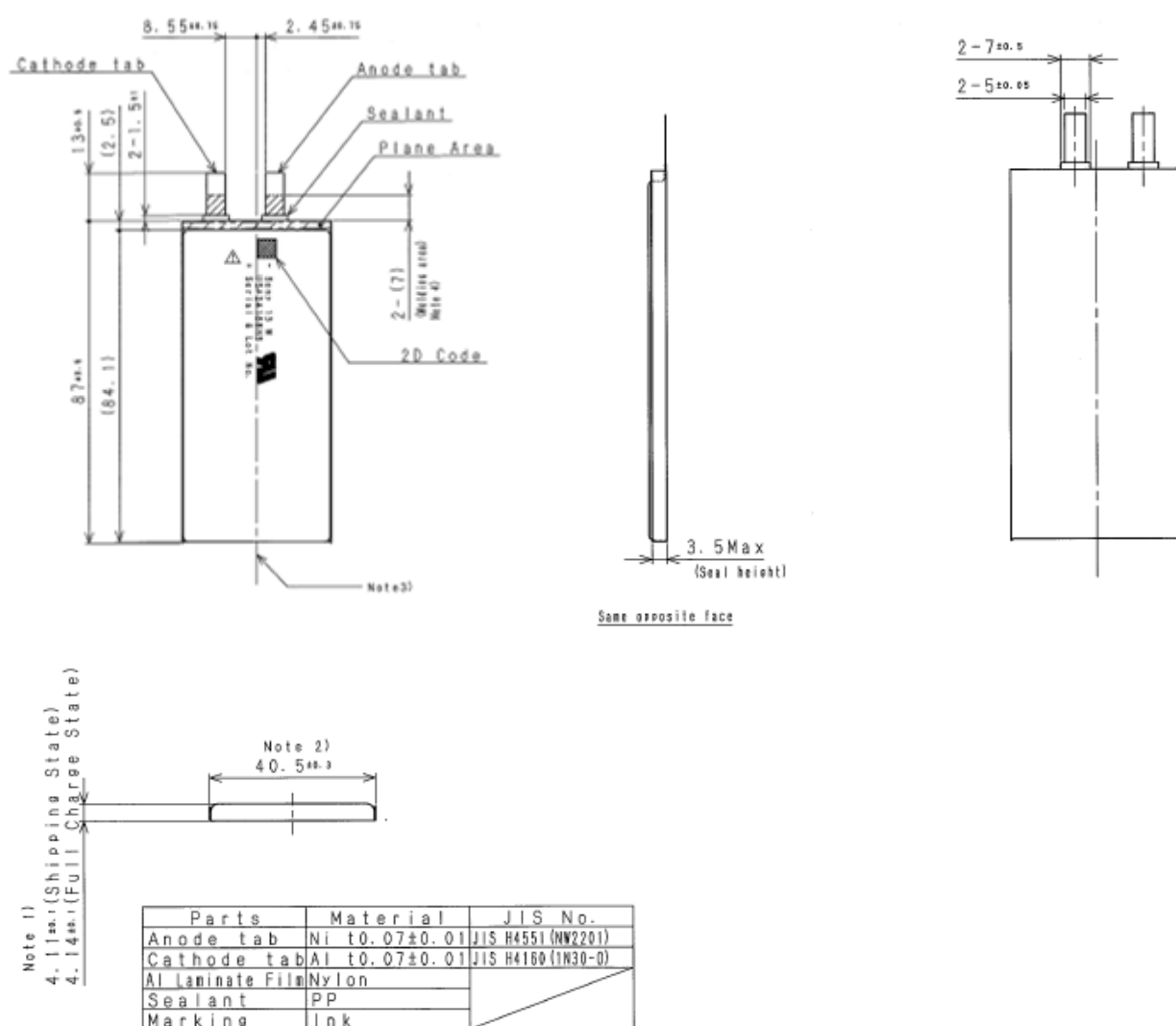
11 Note

- 1) If doubt or inconvenience with this specification arises, it will be modified or revised on mutual discussion.
- 2) This specification spec is suitable until 15 month from Cell Production date.

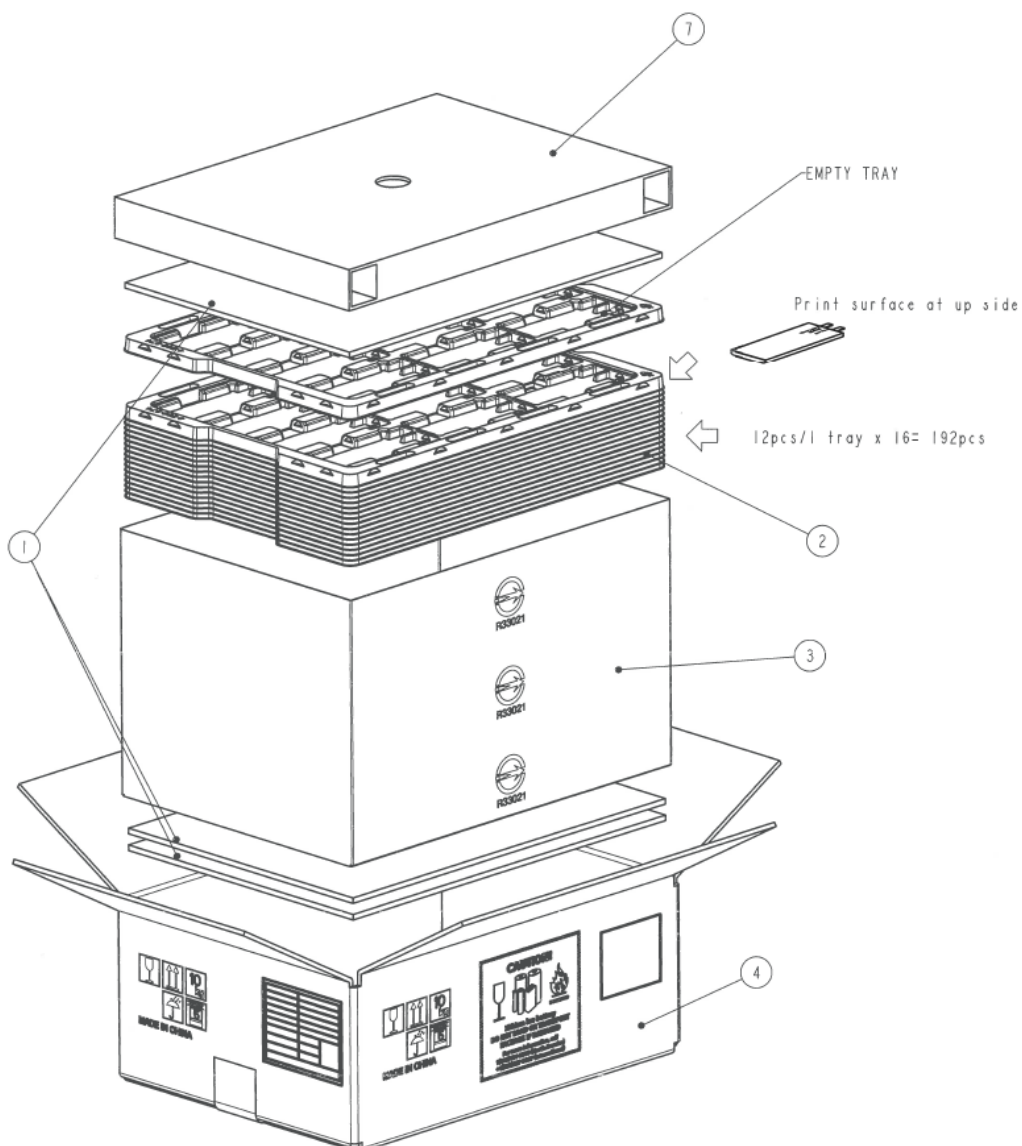
12 Outline Drawing

•Notes

- 1) Pressed with 5.88N (600gf) at whole area of the cell ,when measured the thickness.
- 2) Pressed with 5.88N (600gf), when measured the width.
- 3) The half divided line of cell width of 40.5mm is defined with 5.88N (600gf).



13 Packing Instruction





MADE IN CHINA

DETAIL A

STAMP
COLOR: BLACK

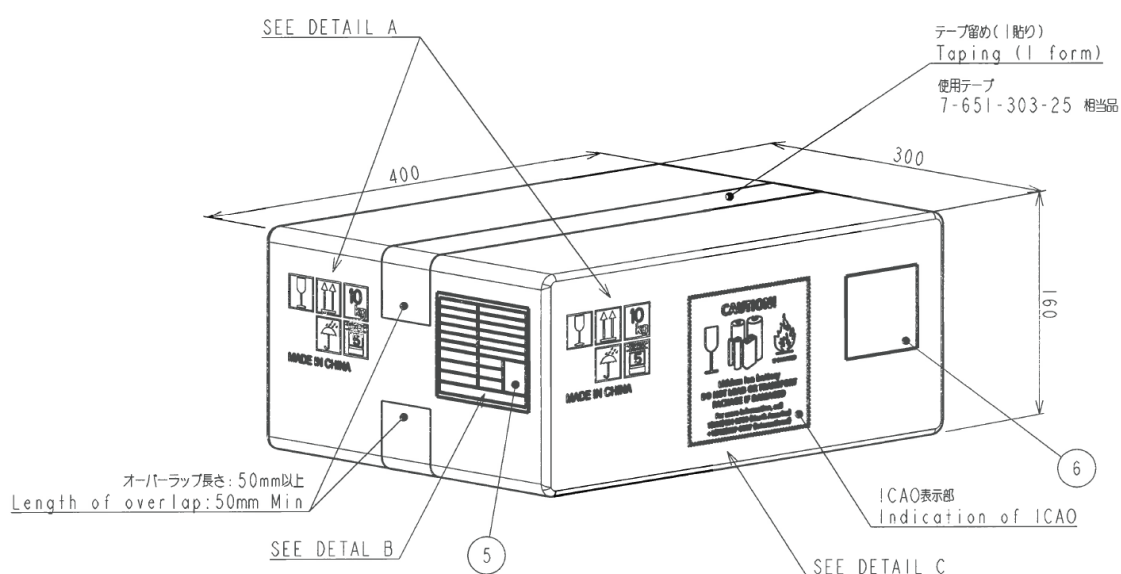
CUSTOMER PARTS CODE	
MODEL NAME (Sony)	
PARTS CODE (Sony)	
CELL NAME (Sony)	
SUPPLIER	
CELL LOT No. & QTY	
LOT No.	
CARTON No.	
QUANTITY	
REMARKS:	

DETAIL B

DATE MATRIX



DETAIL C

ICAO
CONTENT

No.	PARTS NUMBER	DESCRIPTION	QTY
1	2-167-672-1□	PAD(5mm)	8/204
2	4-565-413-0□	TRAY(TR270 US445964)	18/204
3	4-125-706-1□	BAG, POLYETHYLENE	1/204
4	4-453-710-0□	MASTER CARTON	1/204
5	4-105-117-1□	LABEL	1/204
6		CELL LOT No. & QTY	1/204

Key Material Related Information

Pj name		A5	Supplier Cell Part #	US424188H5
Raw Materials		Raw Material Supplier ID	Raw Material Part ID	List Critical Parameters with Specification and Revision Numbers
Electrode and Electrolyte Material	Positive (Cathode) Electrode:			
	Current Collector	P019	7-249-009-14	t0.012
		P270	7-249-009-22	t0.012
	Active Material	P169	7-349-039-21	LiCoO2
	Binder Material	0119	7-349-000-03	
	Slurry Solvent	0127	7-440-000-70	
		0142	7-440-000-73	
	Others	0121	7-349-001-73	Carbon
	Negative (Anode) Electrode:			
	Current Collector	P021	7-249-007-58	t0.008
		P245	7-249-009-64	t0.008
		P261	7-249-009-70	t0.008
	Active Material A	P303	7-349-030-89	Graphite
	Active Material B	P255	7-349-040-36	Graphite
	Binder Material	0119	7-349-015-47	
	Slurry Solvent	0127	7-440-000-70	
		0142	7-440-000-73	
	Others	P306	7-349-029-51	Carbon
		0222	7-349-003-80	Carbon
	Electrolyte:			
	Electrolyte Materials A	P204	7-440-005-29	
		P226	7-440-005-32	
	Electrolyte Materials B	P204	7-440-007-20	
	Electrolyte Materials C	P204	7-440-006-89	
	Electrolyte Materials D	P131	7-349-015-48	
	Electrolyte Materials E	P175	7-349-018-69	Al2O3
Jellyroll Assembly and Insulation	Separator Details:			
	Base Material and Thickness	P003	7-349-032-30	t0.007
	Positive (Cathode) Electrode:			
	Tab	P314	7-449-004-86	Al t0.07
	Tab Tape	P309	7-349-035-77	PET t0.015
	Electrode Coating Interface Protection at Initiation (both sides)	P309	7-349-035-77	PET t0.015
	Electrode Coating Interface Protection at Termination (both sides)	P309	7-349-032-28	PET t0.015
	Negative (Anode) Electrode:			
	Tab	P315	7-449-004-91	Ni t0.07
	Electrode Initiation Protection (if any)	P363	7-349-041-55	PP t0.015
Cell External	Jelly Roll Tape		0389	7-349-007-90
	Can or Pouch		P321	7-349-035-12
				Al laminated film t0.076