

To be the most creative Lithium battery company, and make outstanding contributions to sustainable development.



EVE INR21700/40PL Test Report

C

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1. Cell Specification

INR21700/40PL	No.	Item		Specification
	1	Nominal Capacity	0.2C	4000mAh
	2	Nominal Energy	0.2C	14.4Wh
	3	Dimension	Diameter	21.15±0.10mm
	4		Height	70.15±0.15mm
	5	Weight		67.0g Max
	6	Operating Voltage Range		4.2V~2.5V
	7	Impedance	ACR	≤5mΩ
	8		DCR	≤11mΩ
	9	Continuous Charge Current	Standard	2A
	10		Maximum	8A
	11	Continuous Discharge Current	Standard	0.8A
	12		Maximum	90A
	13	Cycle life (RT, 4.2V~2.5V)		6A/40A 400 th 60%
	14	Operation Temperature Range (Cell surface)	Charge	0~60°C
For reference only	15		Discharge	-20~80°C

2. Electrical Performance -- Summary

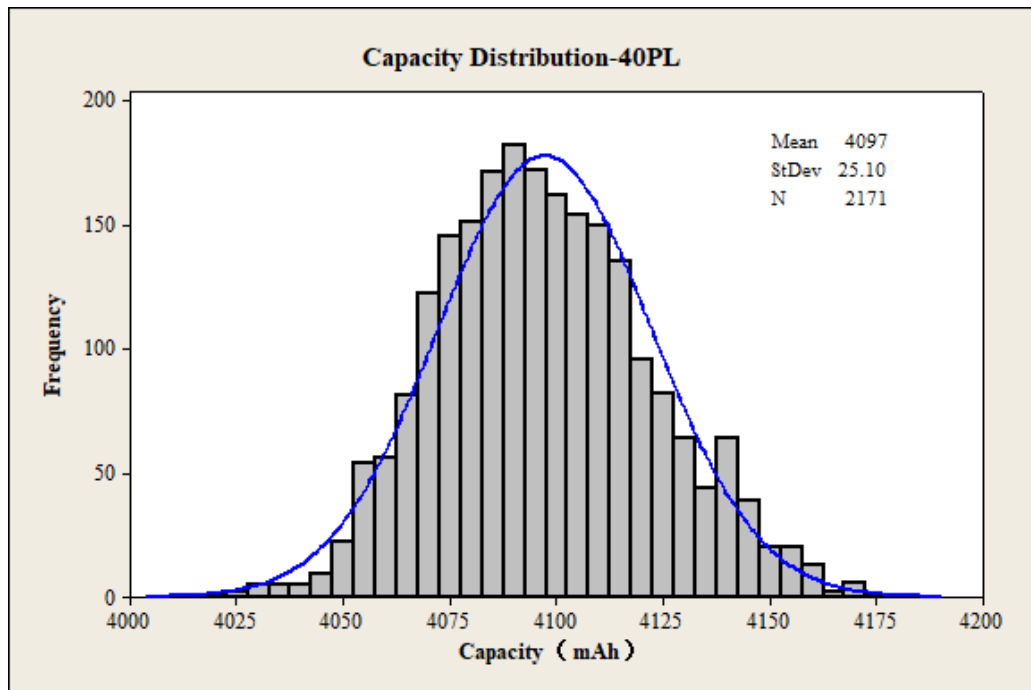
No.	Item		Unit	Spec	INR21700/40PL	Page
1	Capacity@0.2C		mAh	≥ 4000	4097	5
2	Impedance	ACR@30%SOC	m Ω	≤ 5	3.00	6
3		DCR@100%SOC	m Ω	≤ 11	8.01	7
4	Rate Discharge	10A	%	/	100.0	8
5		20A	%	/	101.2	8
6		30A	%	/	102.0	8
7		40A	%	/	102.1	8
8		50A	%	/	92.7	8
9		60A	%	/	72.8	8
10		70A	%	/	59.8	8
11		80A	%	/	53.4	8
12		90A	%	/	47.1	8
13		100A	%	/	44.6	8

2. Electrical Performance -- Summary

No.	Item		Unit	Spec	INR21700/40PL	Page
14	Low Temperature Discharge@1.5V cut off	30A (-10 °C)	%	>80%	101	9
15		30A (-20°C)	%	>70%	101	9
16		40A (-10 °C)	%	>80%	103	10
17		40A (-20°C)	%	>70%	102	10
18	Cycle Life@25°C	(6A/10A)500 th	%	> 60%	87.6	11
19		(6A/20A)500 th	%		85.2	12
20		(6A/30A)500 th	%		82.5	13
21		6A/40A)500 th	%		76.1	14
22		(6A/50A)500 th	%		75.4	15
23		(6A/70A)400 th	%		74.9	16
24	Calendar Life	100SOC/60°C/30D	%	/	Capacity Retention: 87.5% Capacity Recovery: 96.9%	17
25		100SOC/60°C/50D	%	/	Capacity Retention: 84.3% Capacity Recovery: 95.3%	17

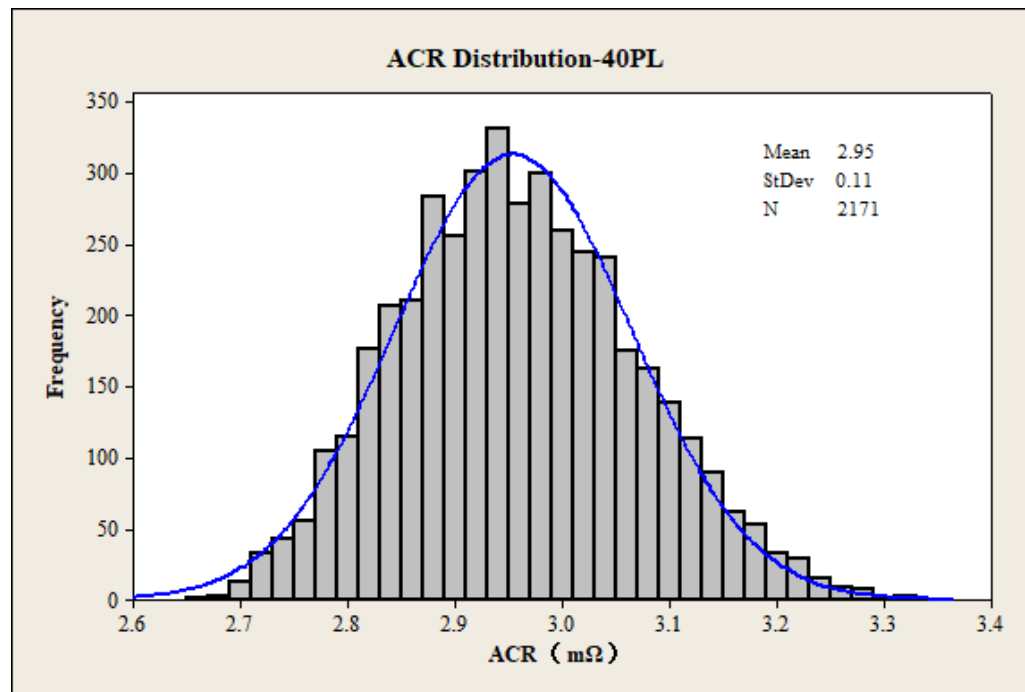
2. Electrical Performance – 0.2C Capacity

- At $25 \pm 2^\circ\text{C}$, discharge by CC=0.8A to 2.5V. Rest for 10min. Then charge by CC=2A and CV=4.2V, 0.1A cut off. Rest for 10min.
- At $25 \pm 2^\circ\text{C}$, test capacity by 0.8A to 2.5V.



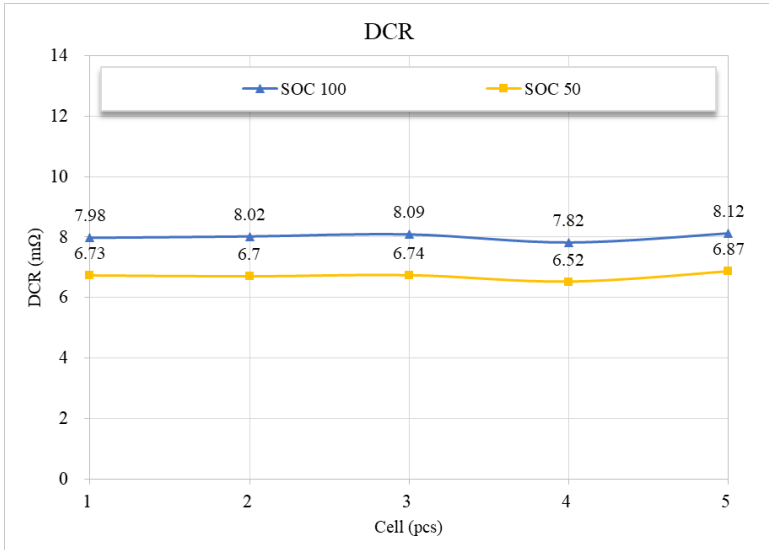
2. Electrical Performance -- ACR

- At $25 \pm 2^\circ\text{C}$, discharge by $\text{CC}=0.8\text{A}$ to 2.5V . Rest for 10min. Then charge by $\text{CC}=4\text{A}$ and $\text{CV}=3.6\text{V}$, 0.1A cut off. Rest for 1h
- At $25 \pm 2^\circ\text{C}$, test ACR by AC impedance at 1kHz .



2. Electrical Performance -- DCR

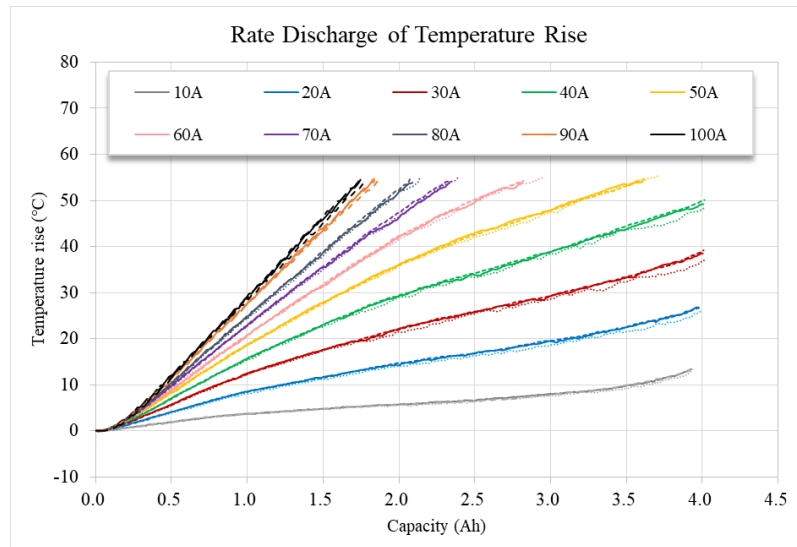
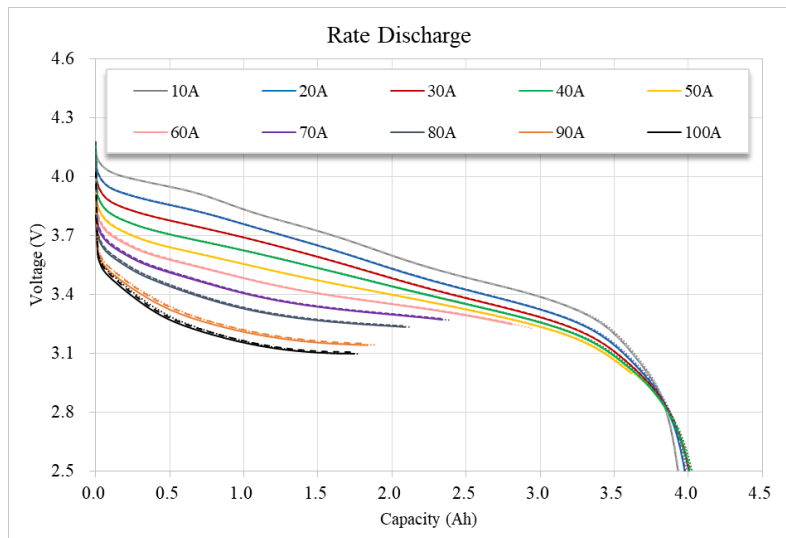
- At $25 \pm 2^\circ\text{C}$, charge by $\text{CC}=4\text{A}$ and $\text{CV}=4.2\text{V}$, 0.1A cut off.
- At $25 \pm 2^\circ\text{C}$ rest for 30min, test DCR by discharge $0.1\text{A}/10\text{s}-10\text{A}/1\text{s}-0.1\text{A}/10\text{s}-10\text{A}/1\text{s}-0.1\text{A}/10\text{s}-10\text{A}/1\text{s}$.
- $\text{DCR}=(\text{V2}-\text{V1})/(\text{I2}-\text{I1}) \rightarrow \text{V1-32sec, V2-33sec, I1-32sec, I2-33sec}$.
- At $25 \pm 2^\circ\text{C}$, charge by $\text{CC}=6\text{A}$ and $\text{CV}=4.2\text{V}$, 0.1A cut off. Discharge the cell with 2A to SOC50.
- At $25 \pm 2^\circ\text{C}$ rest for 30min, test DCR by discharge $0.1\text{A}/10\text{s}-10\text{A}/1\text{s}-0.1\text{A}/10\text{s}-10\text{A}/1\text{s}-0.1\text{A}/10\text{s}-10\text{A}/1\text{s}$.
- $\text{DCR}=(\text{V2}-\text{V1})/(\text{I2}-\text{I1}) \rightarrow \text{V1-32sec, V2-33sec, I1-32sec, I2-33sec}$.



No.	40PL	
	100% SOC@RT	50% SOC@RT
1	7.98	6.73
2	8.02	6.70
3	8.09	6.74
4	7.82	6.52
5	8.12	6.87
Avg.	8.01	6.71
Spec	≤11	

2. Electrical Performance -- Rate Discharge

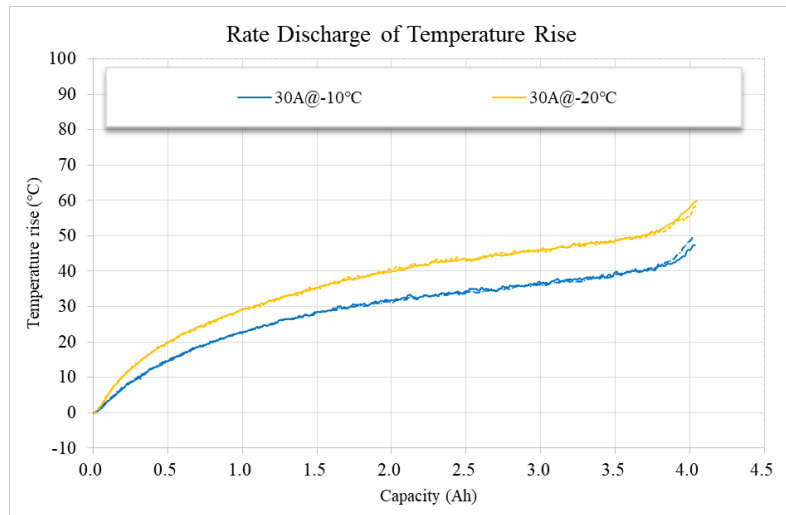
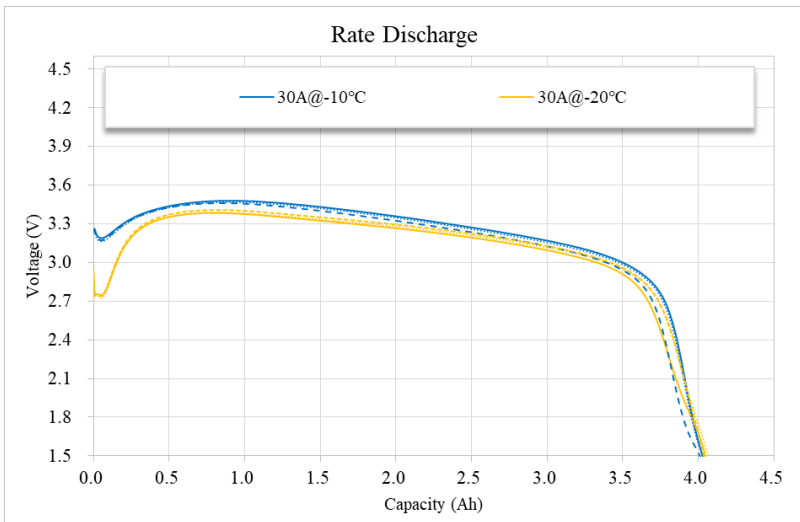
- At $25 \pm 2^\circ\text{C}$, charge by CC=6A and CV=4.2V, 0.1A cut off. Rest for 10min.
- At $25 \pm 2^\circ\text{C}$, discharge by 10A/20A/30A/40A/50A/60A/70A/80A/90A/100A to 2.5V, 80°C cut off. Rest for 30min



Capacity%	10A	20A	30A	40A	50A	60A	70A	80A	90A	100A
1	100.0	101.1	101.9	102.0	91.8	71.5	59.6	53.2	46.7	44.4
2	100.0	101.4	102.2	102.4	94.3	75.2	60.7	54.3	47.9	45.1
3	100.0	101.1	101.9	102.1	92.0	71.7	59.3	52.7	46.6	44.3
Avg.	100.0	101.2	102.0	102.1	92.7	72.8	59.8	53.4	47.1	44.6

2. Electrical Performance -- Low Temperature Discharge @30A

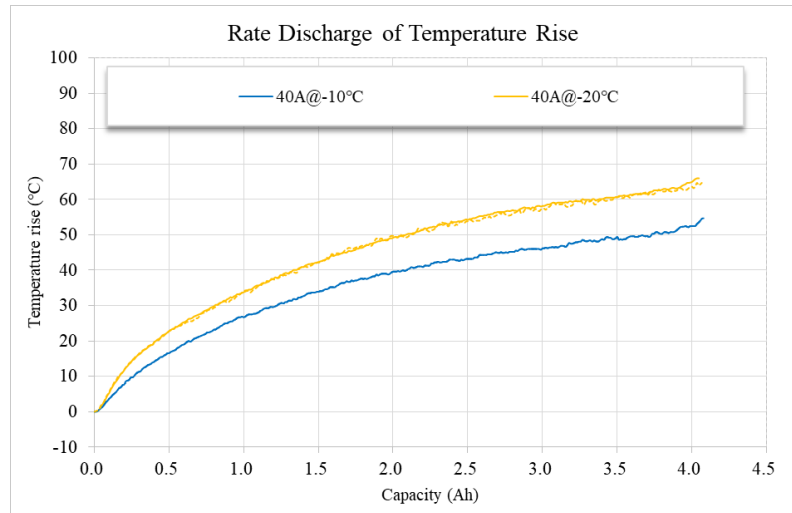
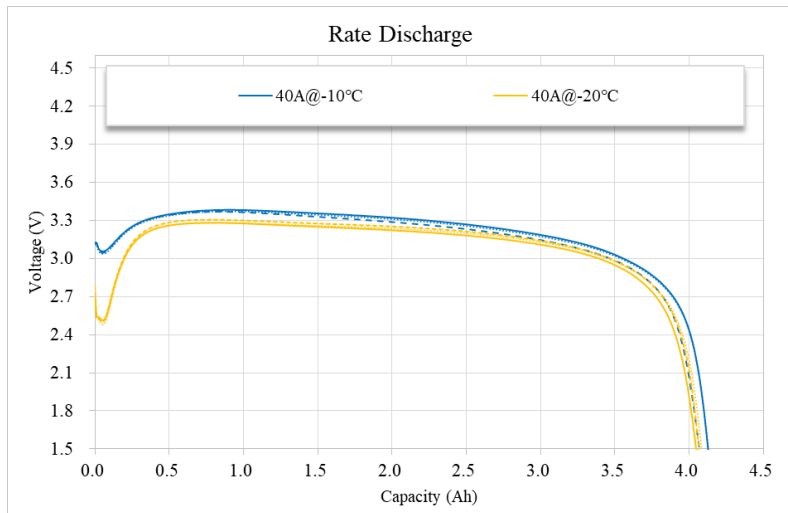
- At $25 \pm 2^\circ\text{C}$, charge by $\text{CC}=6\text{A}$ and $\text{CV}=4.2\text{V}$, 0.1A cut off. Rest for 30min.
- $-10/-20^\circ\text{C} \pm 2^\circ\text{C}$ rest 3h, discharge by 30A to 1.5V .



Capacity/%	-20 $^\circ\text{C}$	-10 $^\circ\text{C}$
1	101	101
2	102	101
3	101	100
Avg.	101	101
Spec	>70	>80

2. Electrical Performance -- Low Temperature Discharge @40A

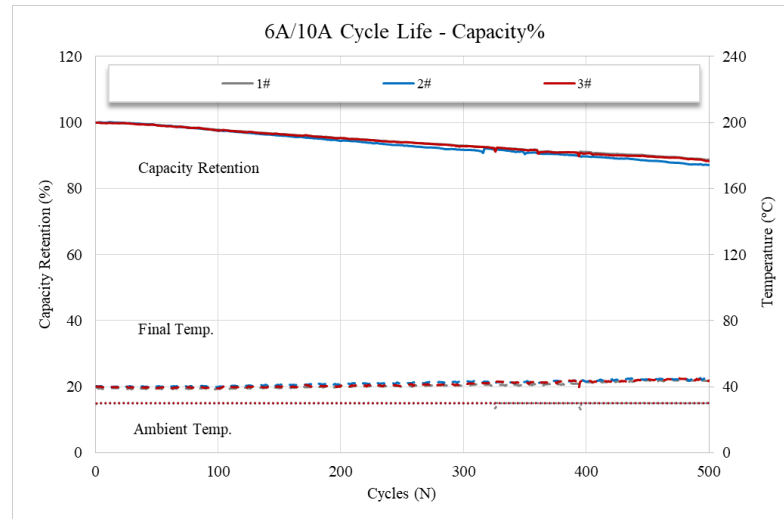
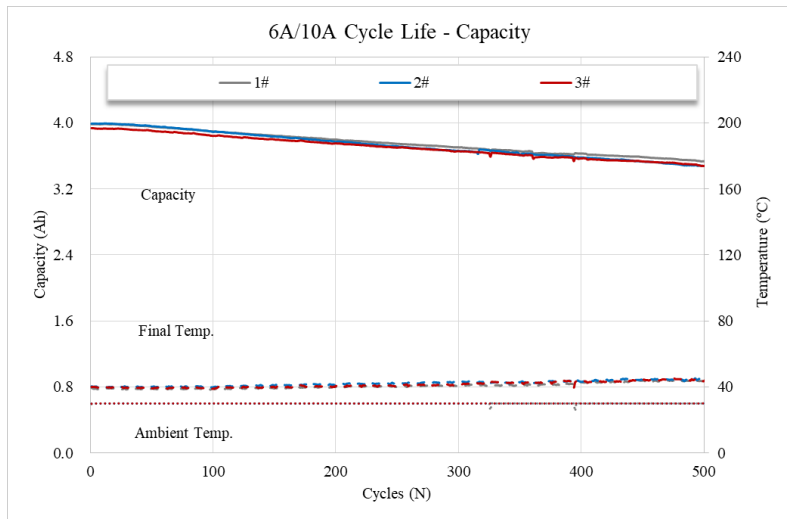
- At $25 \pm 2^\circ\text{C}$, charge by $\text{CC}=6\text{A}$ and $\text{CV}=4.2\text{V}$, 0.1A cut off. Rest for 30min.
- $-10/-20^\circ\text{C} \pm 2^\circ\text{C}$ rest 3h, discharge by 40A to 1.5V .



Capacity/%	-20°C	-10°C
1	101	103
2	102	103
3	102	102
Avg.	102	103
Spec	>70	>80

2. Electrical Performance -- 6A/10A Cycle Life@25°C

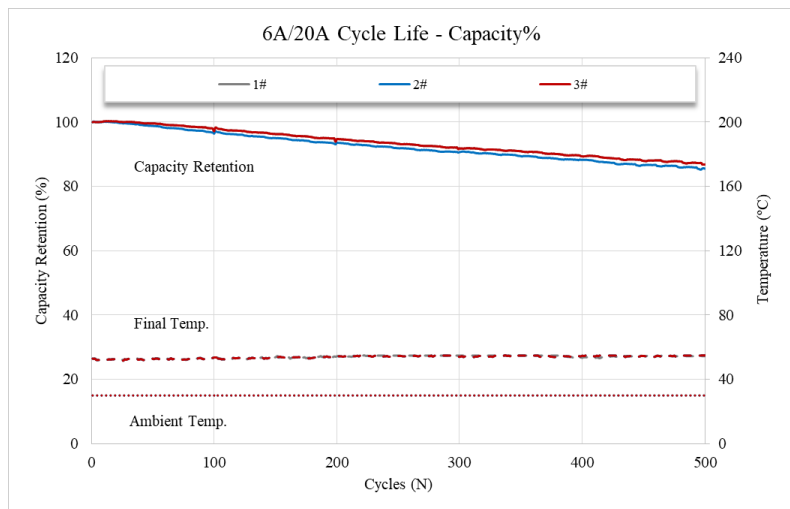
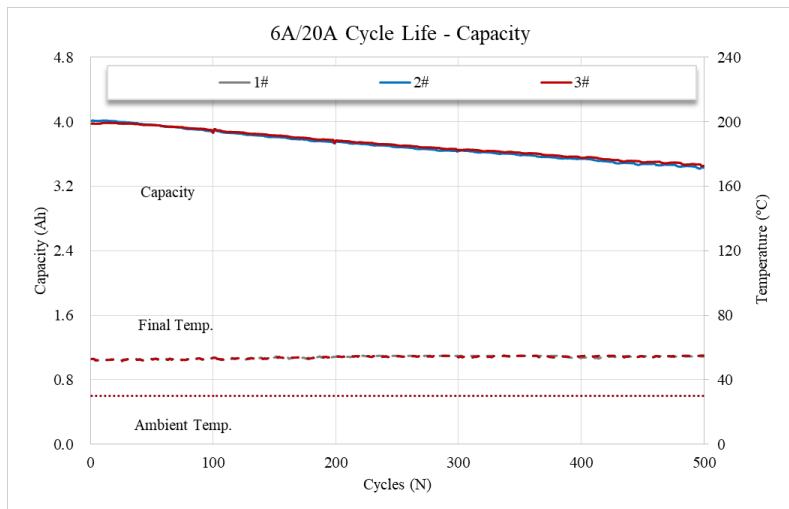
- At 25±2°C, charge by CC=6A and CV=4.2V, 0.25A cut off. Rest for 1min.
- Discharge by CC=10A to 2.5V. If the temperature during discharge exceeds 75°C, stop the discharge procedure, wait for 1min and continue discharging again until the voltage is 2.5V. Rest for T_{cell} < 30°C. Cycle for 500 times.



Capacity Retention (%)	1#	2#	3#	Avg.	Spec
500 cycles	88.8	87.5	86.5	87.6	≥ 60

2. Electrical Performance -- 6A/20A Cycle Life@25°C

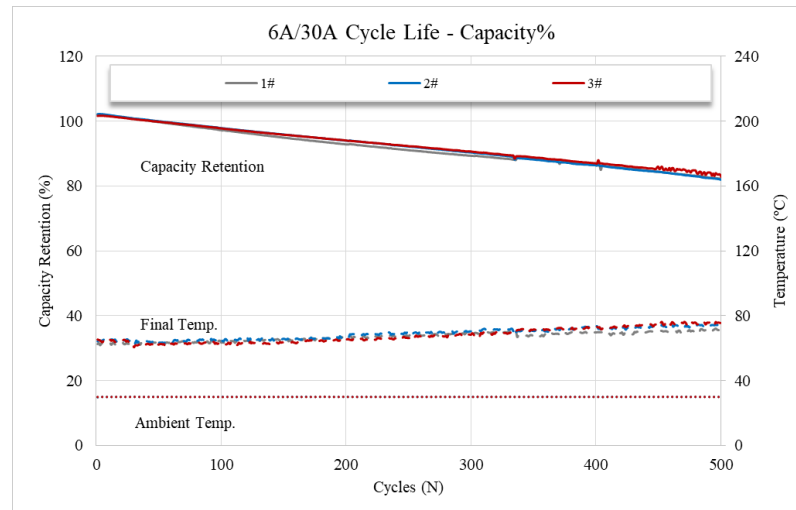
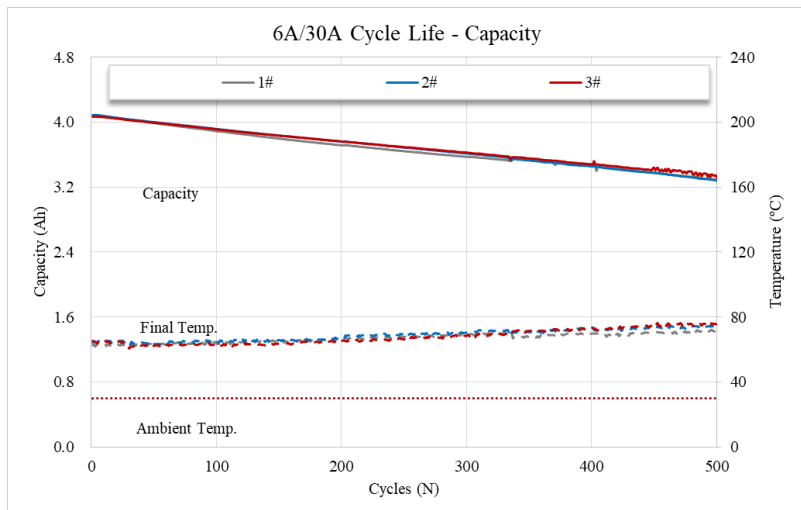
- At $25 \pm 2^\circ\text{C}$, charge by CC=6A and CV=4.2V, 0.25A cut off. Rest for 1min.
- Discharge by CC=20A to 2.5V. If the temperature during discharge exceeds 75°C , stop the discharge procedure, wait for 1min and continue discharging again until the voltage is 2.5V. Rest for $T_{\text{cell}} < 30^\circ\text{C}$. Cycle for 500 times.



Capacity Retention (%)	1#	2#	3#	Avg.	Spec
500 cycles	86.8	84.3	84.6	85.2	≥ 60

2. Electrical Performance -- 6A/30A Cycle Life@25°C

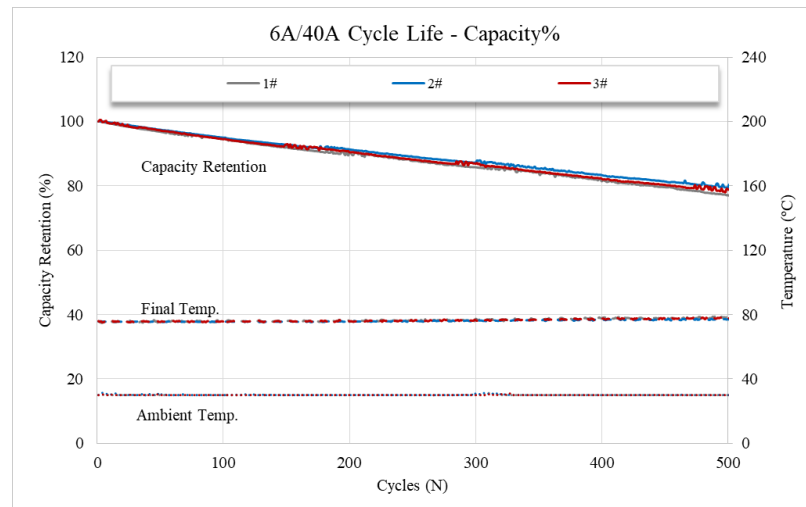
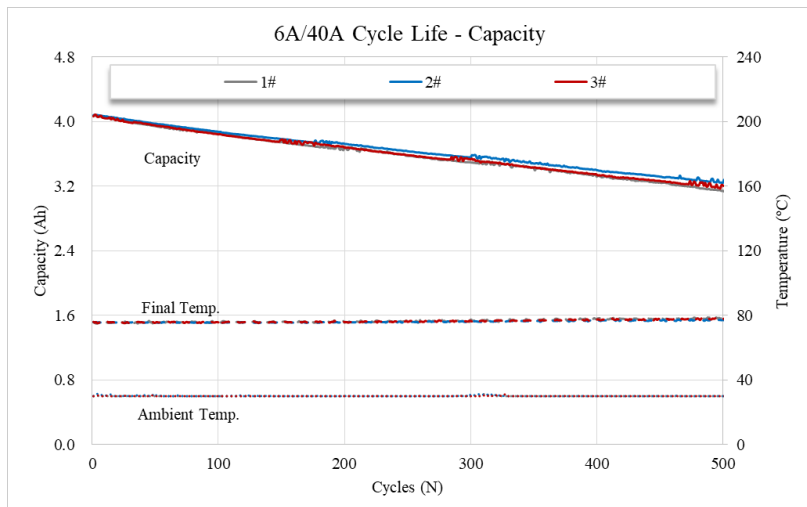
- At 25±2°C, charge by CC=6A and CV=4.2V, 0.25A cut off. Rest for 1min.
- Discharge by CC=30A to 2.5V. If the temperature during discharge exceeds 75°C, stop the discharge procedure, wait for 1min and continue discharging again until the voltage is 2.5V. Rest for T_{cell} < 30°C. Cycle for 500 times.



Capacity Retention (%)	1#	2#	3#	Avg.	Spec
500 cycles	82.4	82.0	83.3	82.5	≥ 60

2. Electrical Performance -- 6A/40A Cycle Life@25°C

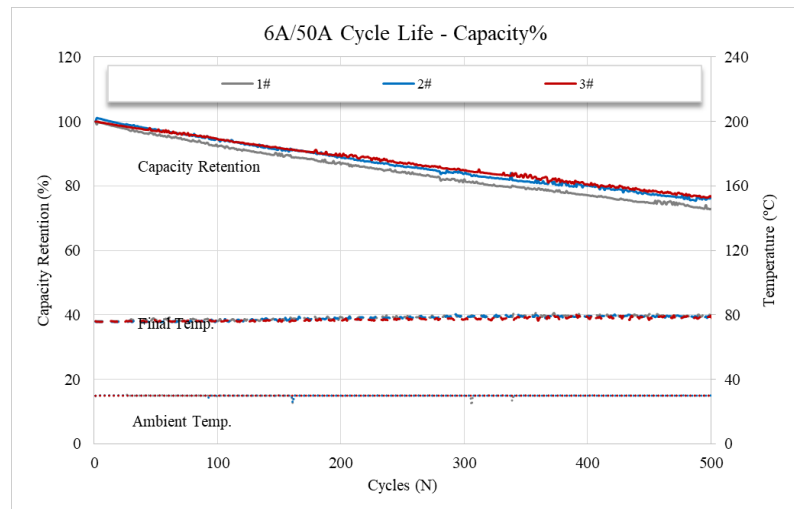
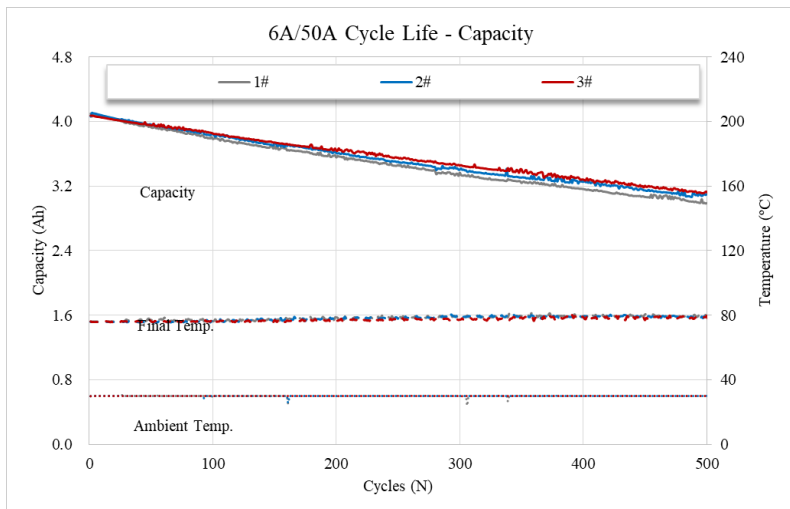
- At $25 \pm 2^\circ\text{C}$, charge by CC=6A and CV=4.2V, 0.25A cut off. Rest for 1min.
- Discharge by CC=40A to 2.5V. If the temperature during discharge exceeds 75°C , stop the discharge procedure, wait for 1min and continue discharging again until the voltage is 2.5V. Rest for $T_{\text{cell}} < 30^\circ\text{C}$. Cycle for 500 times.



Capacity Retention (%)	1#	2#	3#	Avg.	Spec
500 cycles	77.2	72.1	79.0	76.1	≥ 60

2. Electrical Performance -- 6A/50A Cycle Life@25°C

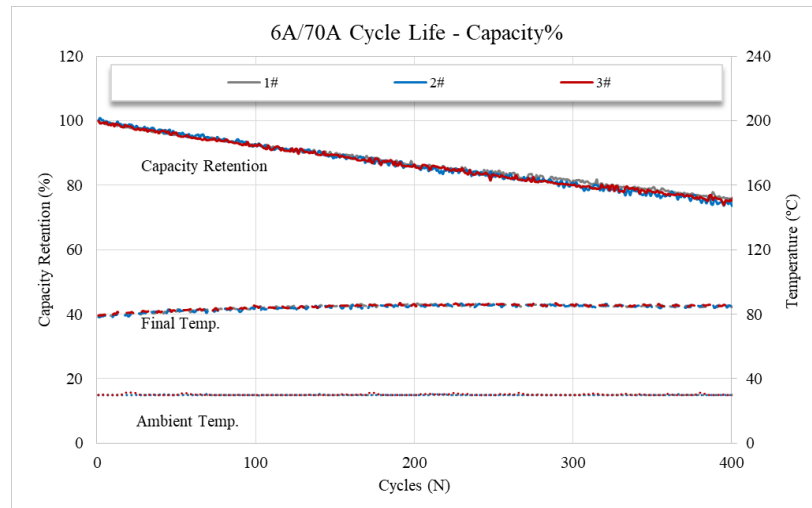
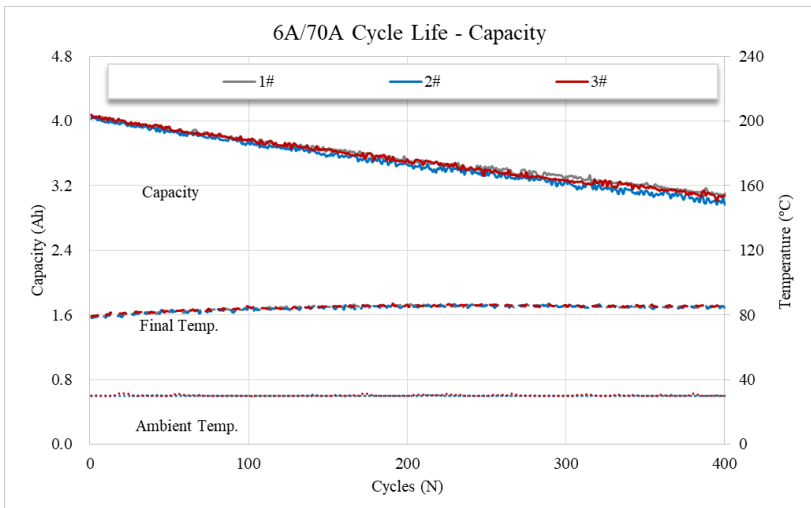
- At $25 \pm 2^\circ\text{C}$, charge by CC=6A and CV=4.2V, 0.25A cut off. Rest for 1min.
- Discharge by CC=50A to 2.5V. If the temperature during discharge exceeds 75°C , stop the discharge procedure, wait for 1min and continue discharging again until the voltage is 2.5V. Rest for $T_{\text{cell}} < 30^\circ\text{C}$. Cycle for 500 times.



Capacity Retention (%)	1#	2#	3#	Avg.	Spec
500 cycles	72.9	76.3	76.8	75.4	≥ 60

2. Electrical Performance -- 6A/70A Cycle Life@25°C

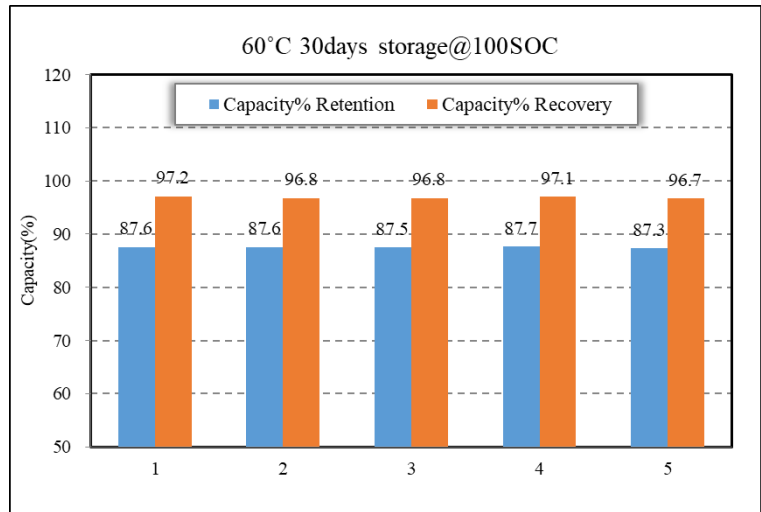
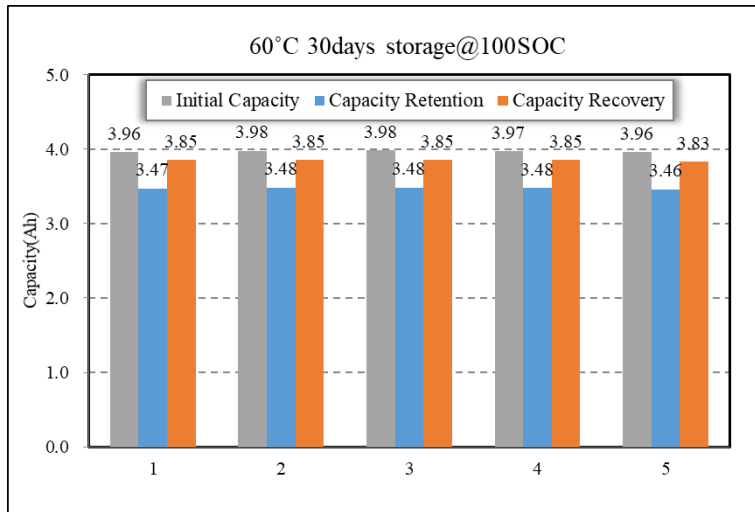
- At 25±2°C, charge by CC=6A and CV=4.2V, 0.25A cut off. Rest for 1min.
- Discharge by CC=70A to 2.5V. If the temperature during discharge exceeds 75°C, stop the discharge procedure, wait for 1min and continue discharging again until the voltage is 2.5V. Rest for T_{cell} < 30°C. Cycle for 400 times.



Capacity Retention (%)	1#	2#	3#	Avg.	Spec
400 cycles	75.6	73.7	75.3	74.9	≥ 60

2. Electrical Performance -- Calendar Life

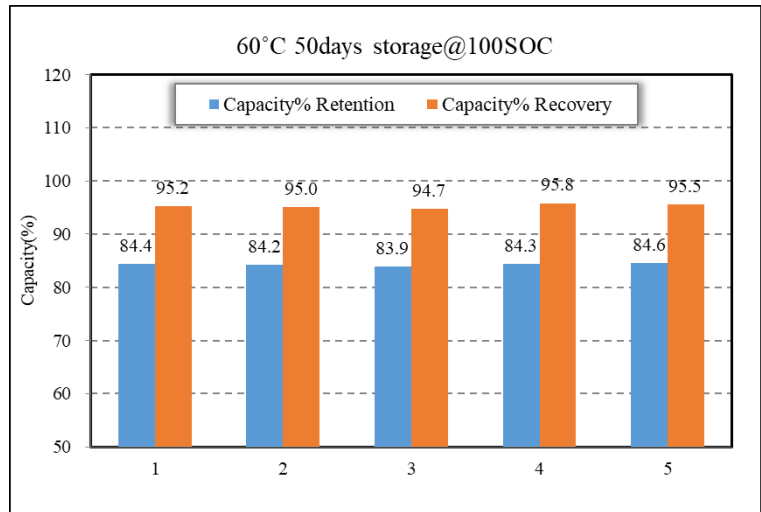
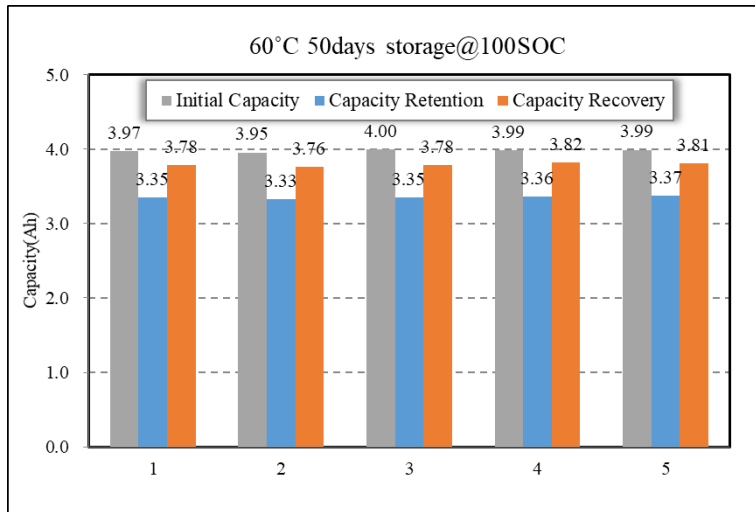
- At $25\pm 2^{\circ}\text{C}$, Charge by CC=6A and CV=4.2V, 0.1A cut off. rest 15mins.
- 100%SOC cells stored at $60\pm 2^{\circ}\text{C}$ for 30days.
- Discharge by 10A to 2.5V, record retention capacity, repeat step1 for 3 cycles and record recovery capacity.



Item	1#	2#	3#	4#	5#	Avg.	Spec
Capacity Retention(%)	87.6	87.6	87.5	87.7	87.3	87.5	/
Capacity Recovery(%)	97.2	96.8	96.8	97.1	96.7	96.9	/

2. Electrical Performance -- Calendar Life

- At 25±2°C, Charge by CC=6A and CV=4.2V, 0.1A cut off. rest 15mins.
- 100%SOC cells stored at 60±2°C for 50days.
- Discharge by 10A to 2.5V, record retention capacity, repeat step1 for 3 cycles and record recovery capacity.



Item	1#	2#	3#	4#	5#	Avg.	Spec
Capacity Retention(%)	84.4	84.2	83.9	84.3	84.6	84.3	/
Capacity Recovery(%)	95.2	95.0	94.7	95.8	95.5	95.3	/

3. Safety Performance -- Summary

No.	Item	Test Condition	Specification	Standard	Conclusion
1	Overcharge	12A charge to 8.4V	No fire, no explosion	UN38.3	Pass
2	External Short Circuit	$80 \pm 20 \text{m}\Omega$	No fire, no explosion	UL1642	Pass
3	Force Discharge	1C discharge 90min	No fire, no explosion, no leakage	IEC62133	Pass
4	Heating Test	$130 \pm 2^\circ\text{C}$ 10min	No fire, no explosion	UL1642	Pass
5	Low Pressure Test	11.6kPa 6hours	< 10%OCV drop	UN38.3	Pass
6	Drop Test	1.0m drop	No fire, no explosion	IEC62133	Pass
7	Vibration Test	7Hz→200Hz→7Hz 15min 12times	No fire, no explosion, no leakage; < 10%OCV drop	UN38.3	Pass

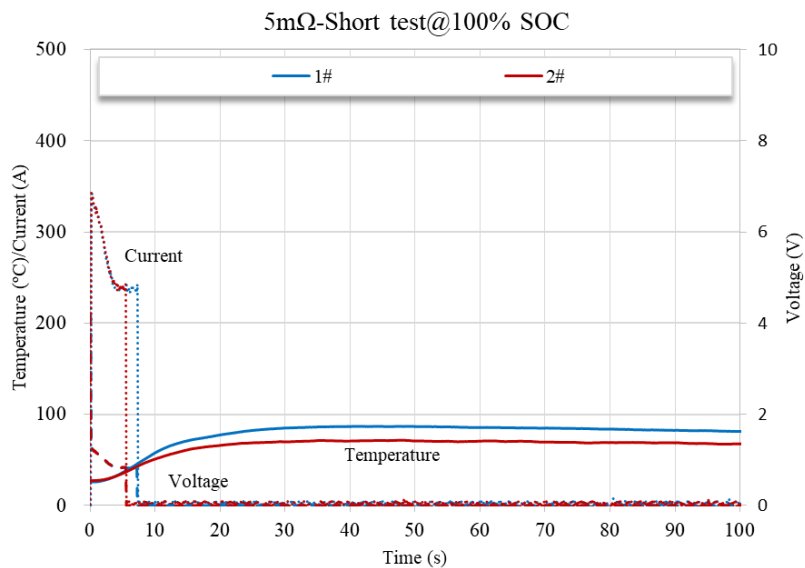
3. Safety Performance -- Short Test

- Charge by CC=2A and CV=4.2V, 0.1A cut off, then short-circuited by connecting with a circuit of 5/10/20/40/60/80/100mΩ at RT.
- No fire and no explosion.

Resistance (mΩ)	No.	Before Test		After Test								Result
		ACR (mΩ)	Voltage (V)	Discharge Time (s)	Max. Current (A)	Max. Temp. (°C)	Al Tab Melt	CID Open	Vent Open	Fire	Explosion	
5mΩ	1#	3.20	4.176	7.2	342	87	Y	N	N	N	N	Pass
	2#	3.23	4.175	5.5	342	72	Y	N	N	N	N	Pass
10mΩ	1#	3.36	4.176	16.0	227	102	N	Y	N	N	N	Pass
	2#	3.42	4.173	15.6	233	101	N	Y	N	N	N	Pass
20mΩ	1#	3.20	4.175	49.5	152	135	N	Y	N	N	N	Pass
	2#	3.24	4.176	48.8	148	122	N	Y	N	N	N	Pass
40mΩ	1#	3.15	4.174	184.8	92	128	N	Y	N	N	N	Pass
	2#	3.20	4.174	192.9	92	126	N	Y	N	N	N	Pass
60mΩ	1#	3.28	4.174	316.2	60	125	N	Y	N	N	N	Pass
	2#	3.35	4.175	313.4	59	129	N	Y	N	N	N	Pass
80mΩ	1#	3.26	4.174	486.2	49	116	N	Y	N	N	N	Pass
	2#	3.16	4.175	459.2	48	123	N	Y	N	N	N	Pass
100mΩ	1#	3.26	4.174	673.4	40	99	N	N	N	N	N	Pass
	2#	3.25	4.176	637.5	40	91	N	N	N	N	N	Pass

3. Safety Performance -- Short Test

- Charge by CC=2A and CV=4.2V, 0.1A cut off, then short-circuited by connecting with a circuit of 5mΩ at RT.
- No fire and no explosion.

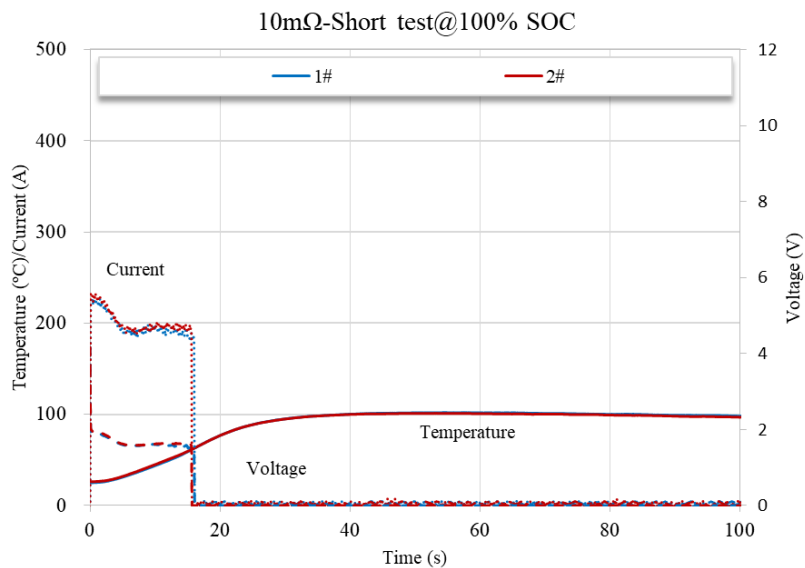


No.	Before		After			
	ACR (mΩ)	Voltage (V)	Discharge Time (s)	Max. Temp. (°C)	CID Open	Vent Open
1#	3.20	4.176	7.2	87	N	N
2#	3.23	4.175	5.5	72	N	N

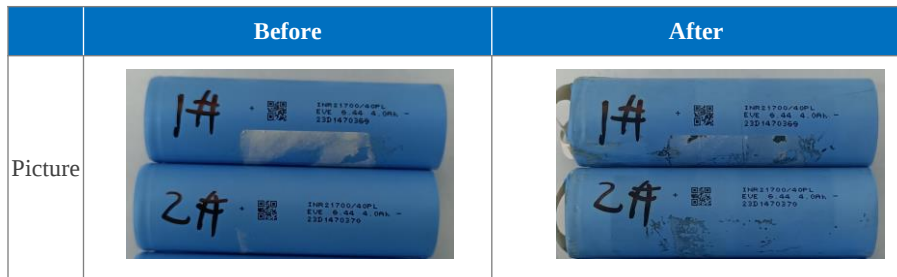
	Before	After
Picture		

3. Safety Performance -- Short Test

- Charge by CC=2A and CV=4.2V, 0.1A cut off, then short-circuited by connecting with a circuit of 10mΩ at RT.
- No fire and no explosion.

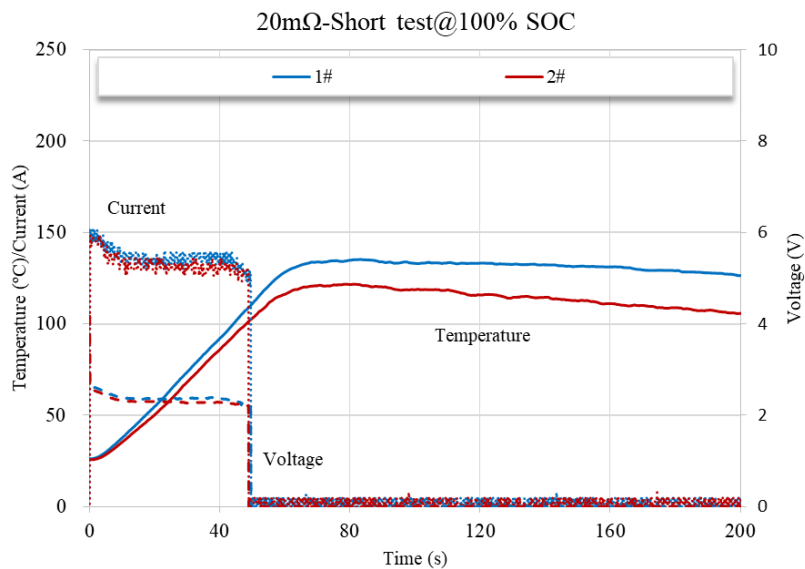


No.	Before		After			
	ACR (mΩ)	Voltage (V)	Discharge Time (s)	Max. Temp. (°C)	CID Open	Vent Open
1#	3.36	4.176	16.0	102	Y	N
2#	3.42	4.173	15.6	101	Y	N



3. Safety Performance -- Short Test

- Charge by CC=2A and CV=4.2V, 0.1A cut off, then short-circuited by connecting with a circuit of 20mΩ at RT.
- No fire and no explosion.

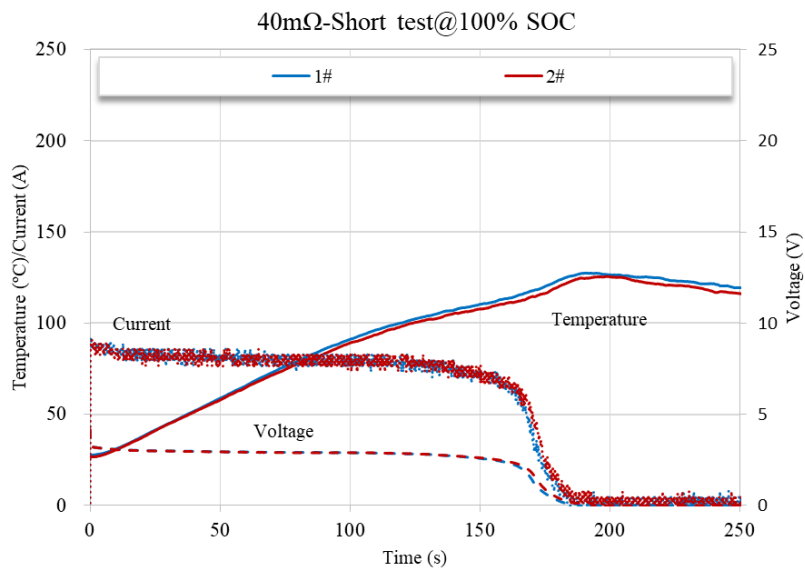


No.	Before		After			
	ACR (mΩ)	Voltage (V)	Discharge Time (s)	Max. Temp. (°C)	CID Open	Vent Open
1#	3.20	4.175	49.5	135	Y	N
2#	3.24	4.176	48.8	122	Y	N

	Before	After
Picture		

3. Safety Performance -- Short Test

- Charge by CC=2A and CV=4.2V, 0.1A cut off, then short-circuited by connecting with a circuit of 40mΩ at RT.
- No fire and no explosion.

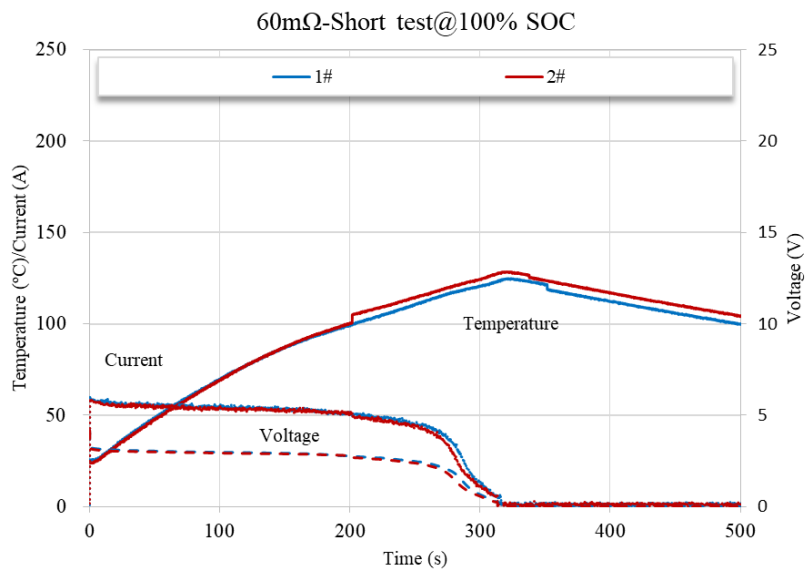


No.	Before		After			
	ACR (mΩ)	Voltage (V)	Discharge Time (s)	Max. Temp. (°C)	CID Open	Vent Open
1#	3.15	4.174	184.8	128	Y	N
2#	3.20	4.174	192.9	126	Y	N

Picture	Before	After

3. Safety Performance -- Short Test

- Charge by CC=2A and CV=4.2V, 0.1A cut off, then short-circuited by connecting with a circuit of 60mΩ at RT.
- No fire and no explosion.

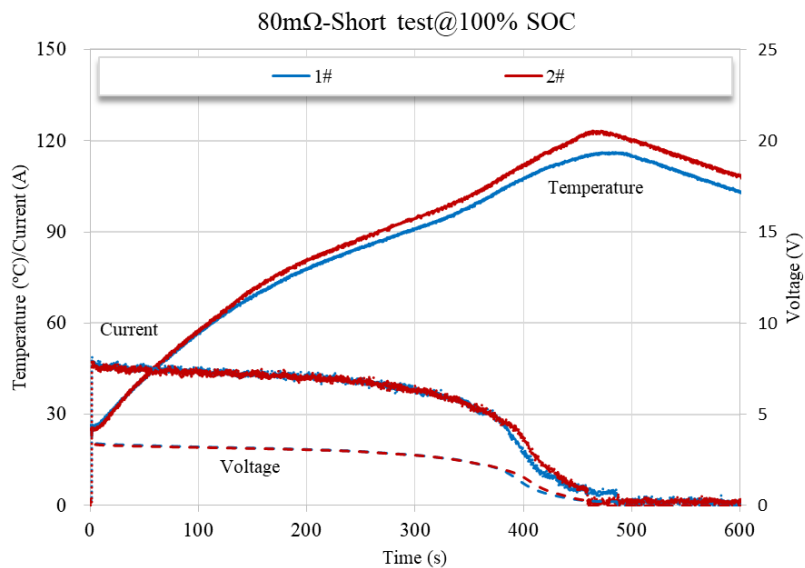


No.	Before		After			
	ACR (mΩ)	Voltage (V)	Discharge Time (s)	Max. Temp. (°C)	CID Open	Vent Open
1#	3.28	4.174	316.2	125	Y	N
2#	3.35	4.175	313.4	129	Y	N

	Before	After
Picture		

3. Safety Performance -- Short Test

- Charge by CC=2A and CV=4.2V, 0.1A cut off, then short-circuited by connecting with a circuit of 80mΩ at RT.
- No fire and no explosion.

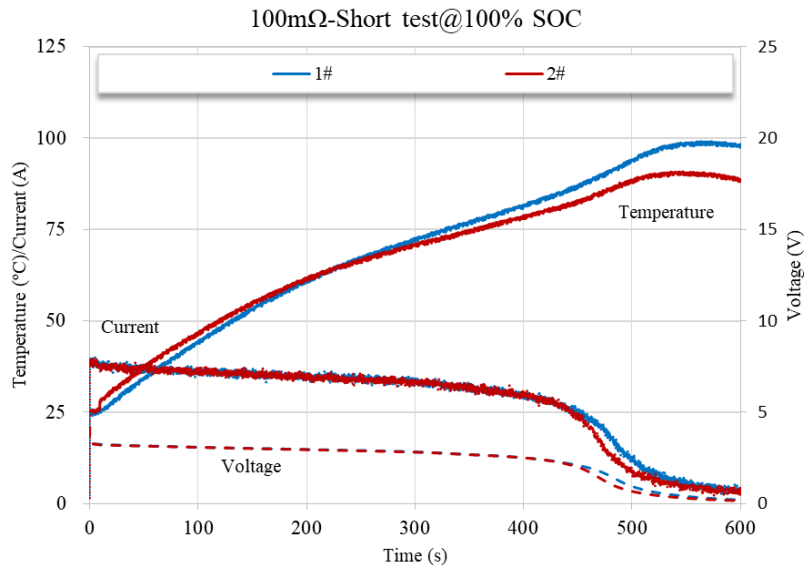


No.	Before		After			
	ACR (mΩ)	Voltage (V)	Discharge Time (s)	Max. Temp. (°C)	CID Open	Vent Open
1#	3.26	4.174	486.2	116	Y	N
2#	3.16	4.175	459.2	123	Y	N

Picture	Before	After

3. Safety Performance -- Short Test

- Charge by CC=2A and CV=4.2V, 0.1A cut off, then short-circuited by connecting with a circuit of 100mΩ at RT.
- No fire and no explosion.



No.	Before		After			
	ACR (mΩ)	Voltage (V)	Discharge Time (s)	Max. Temp. (°C)	CID Open	Vent Open
1#	3.26	4.174	673.4	99	N	N
2#	3.25	4.176	637.5	91	N	N

Picture	Before		After	
				



THANK YOU