

EVE-ICR18650/26V Technical Report

Nov. 2016

Research Department



Make the Best Lithium Battery in the world, and Become a Technology Leader!

1. ICR18650/26V Specifications

Specifications

Item		Specifications
Typical Capacity (0.2C)	4.2~2.5V	2550mAh
	4.1~3.0V	2300mAh
Typical Voltage		3.6V
Typical Capacity Wh	4.2~2.5V	9.18Wh
AC Impedance	1 kHz	23~27mΩ
Charge Current	Standard	0.2C
	Rapid	0.5C
Discharge Current	Standard	0.2C
	Rapid	1C
Charge Operating Temp.		0~45℃
Discharging Operating Temp.		-20~60℃
Storage Temp.		-20~60℃
Dimension		18.4*65.1mm Max.
Weight		45±2g

Dimensions



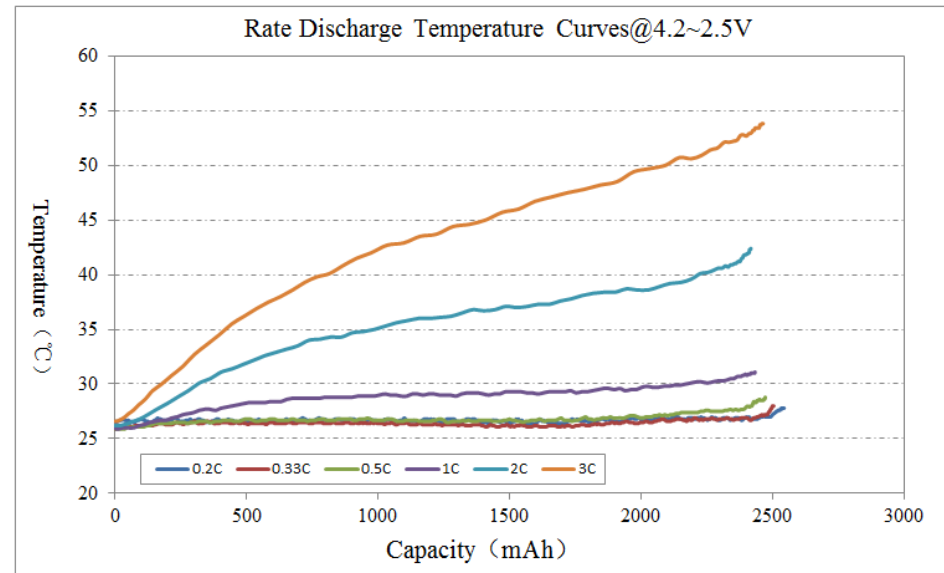
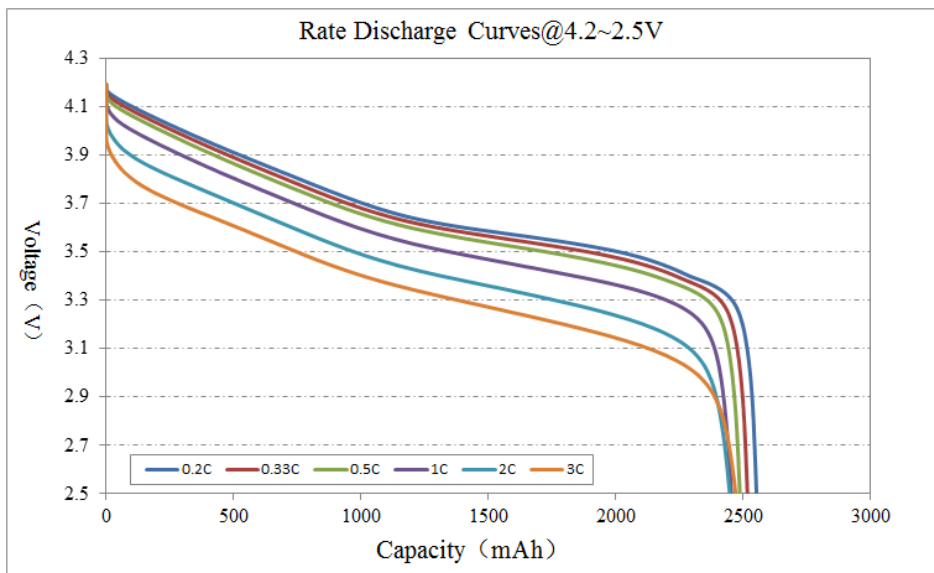
2. Rate Discharge@25℃ 4.2~2.5V

1. Test Condition

- Step 1. Charge by CC=0.2C to 4.2V and CV=4.2V, till current drop to 0.02C
- Step 2. Rest for 10min
- Step 3. Discharge by CC=0.2C/0.33C/0.5C/1C/2C/3C to 2.5V respectively

2. Test Result

Rate	0.2C	0.33C	0.5C	1C	2C	3C
Capacity (mAh)	2568	2524	2493	2452	2437	2483
vs. 0.2C	100.0%	98.3%	97.1%	95.5%	94.9%	96.7%
Cell Temp. (℃)	27.8	28.0	28.8	31.1	42.4	53.8



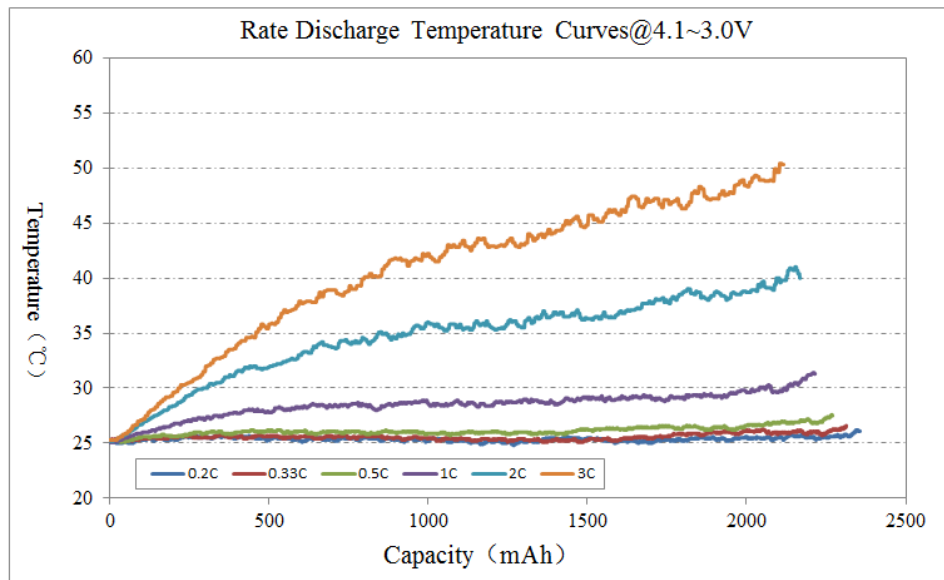
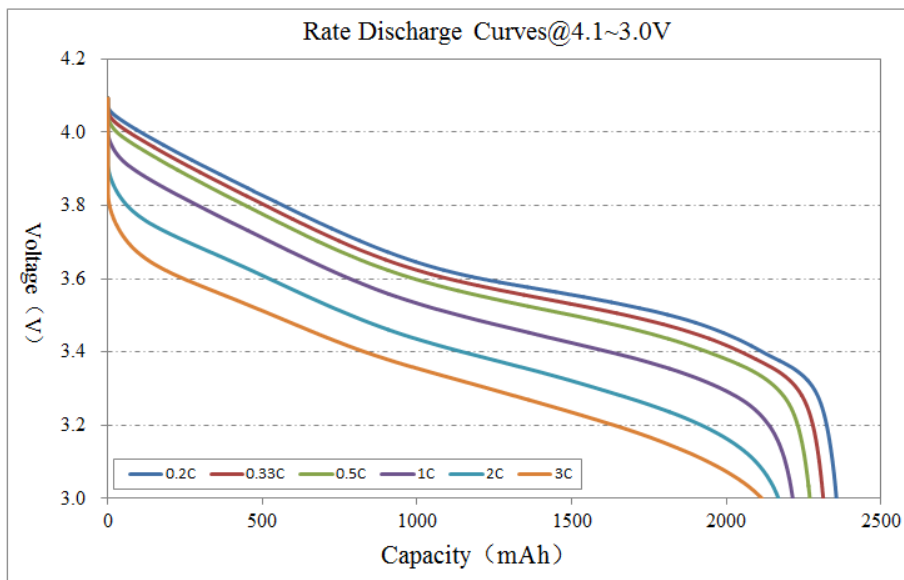
3. Rate Discharge@25℃ 4.1~3.0V

1. Test Condition

- Step 1. Charge by CC=0.2C to 4.1V and CV=4.1V , till current drop to 0.02C
- Step 2. Rest for 10min
- Step 3. Discharge by CC=0.2C/0.33C/0.5C/1C/2C/3C to 3.0V respectively

2. Test Result

Rate	0.2C	0.33C	0.5C	1C	2C	3C
Capacity (mAh)	2356	2332	2290	2233	2186	2135
vs. 0.2C	100.0%	99.0%	97.2%	94.8%	92.8%	90.6%
Cell Temp. (℃)	26.1	26.6	27.5	31.3	40.0	50.3



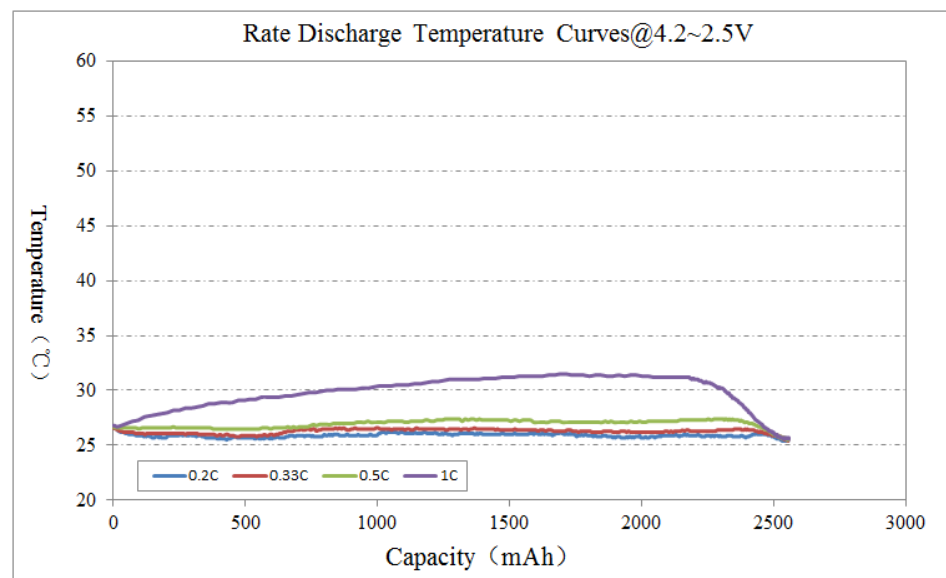
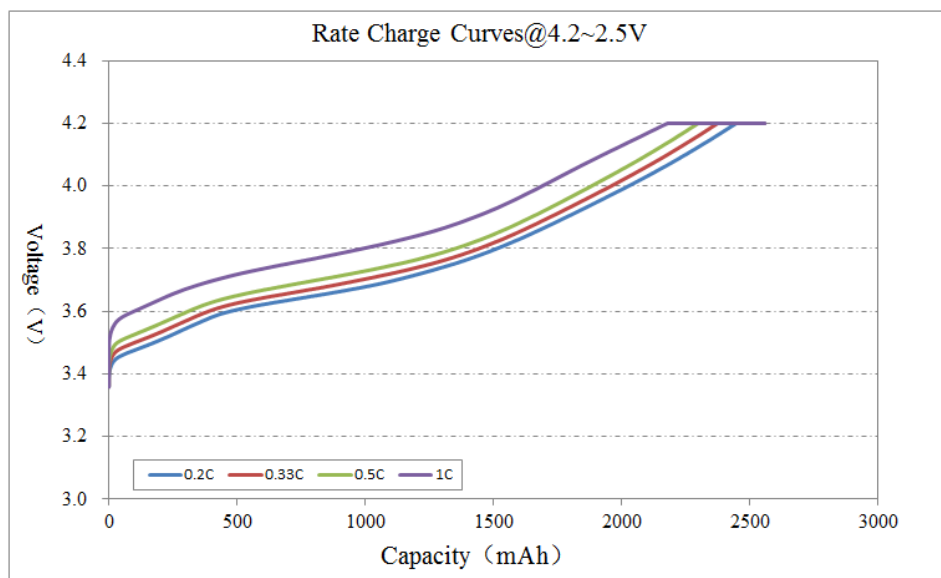
4. Rate Charge@25℃ 4.2~2.5V

1. Test Condition

- Step 1. Discharge by CC=0.2C to 2.5V
- Step 2. Rest for 10min
- Step 3. Charge by CC=0.2C/0.33C/0.5C/1C to 4.2V and CV=4.2V till current drop to 0.02C

2. Test Result

Rate	0.2C	0.33C	0.5C	1C
Capacity (mAh)	2556	2555	2554	2558
Cell Temp. (°C)	26.7	26.6	27.4	31.4



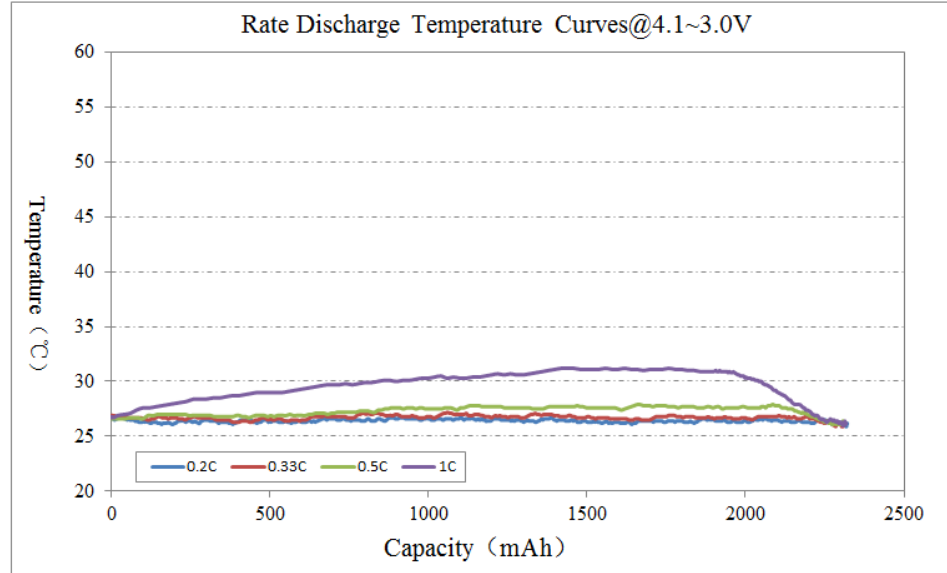
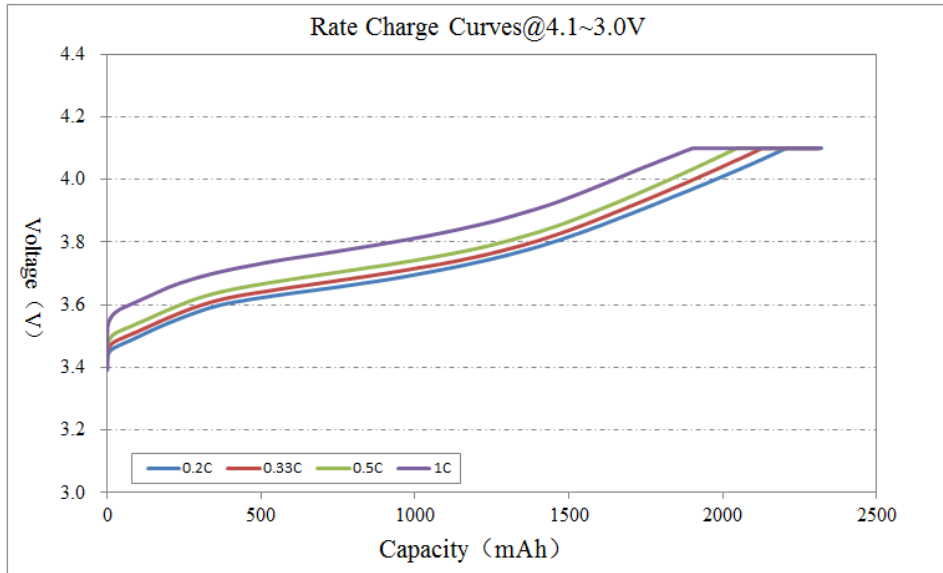
5. Rate Charge@25℃ 4.1~3.0V

1. Test Condition

- Step 1. Discharge by CC=0.2C to 3.0V
- Step 2. Rest for 10min
- Step 3. Charge by CC=0.2C/0.33C/0.5C/1C to 4.1V and CV=4.1V till current drop to 0.02C

2. Test Result

Rate	0.2C	0.33C	0.5C	1C
Capacity (mAh)	2351	2348	2342	2344
Cell Temp. (°C)	26.8	27.2	27.9	31.2

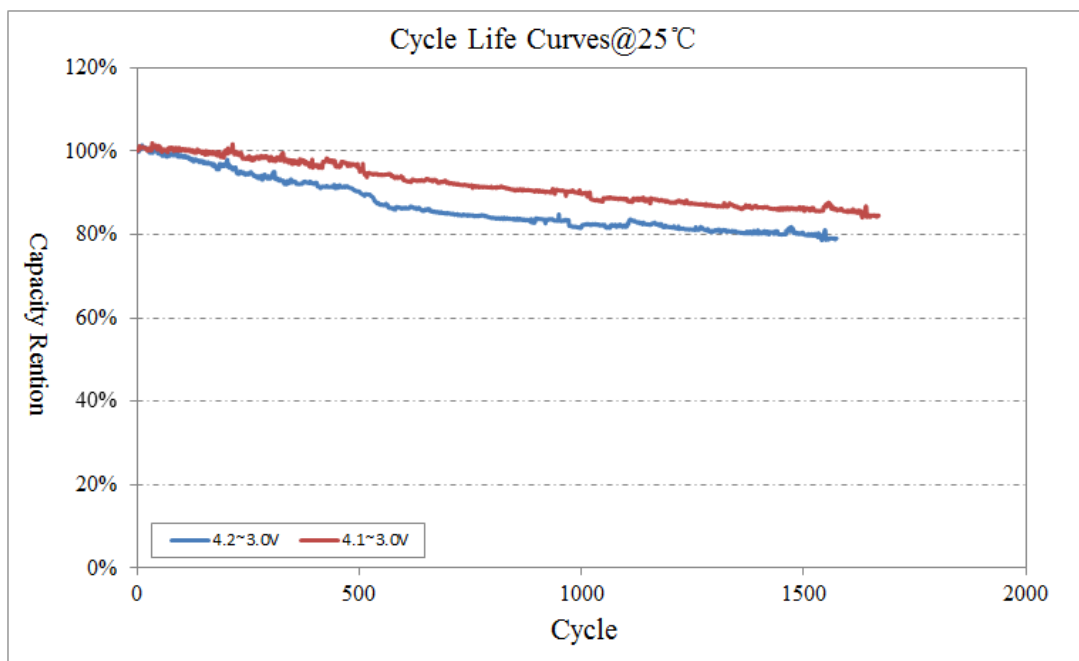


6. Cycle Life@25℃

1. Test Condition

- Step 1. Charge by CC=0.5C to 4.1V/4.2V and CV=4.1V/4.2V till current drop to 0.02C
- Step 2. Rest for 10min
- Step 3. Discharge by CC=1C to 3.0V
- Step 4. Rest for 10min
- Step 5. Cycle for 2000 times

2. Test Result



Cycle	4.2~3.0V	4.1~3.0V
300th	94.1%	97.6%
500th	90.3%	95.9%
800th	84.1%	91.2%
1000th	81.9%	89.7%
1200th	81.6%	87.5%
1500th	80.1%	86.4%

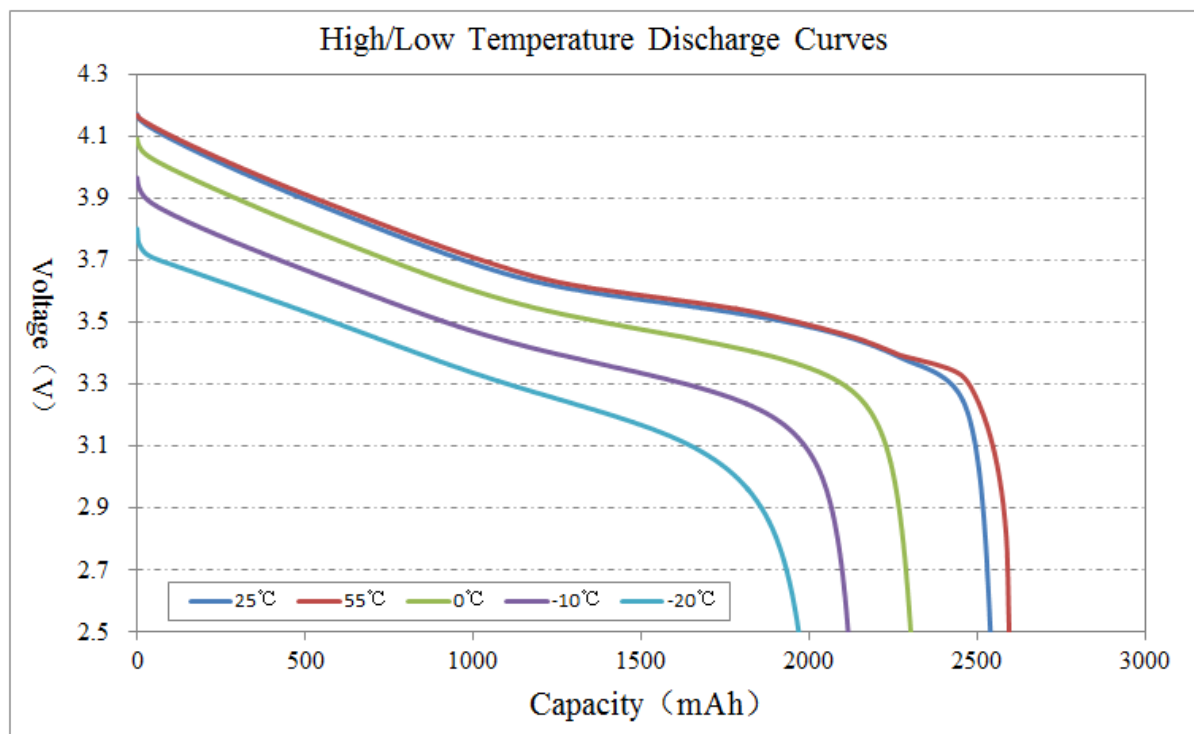
7. High/Low Temperature Discharge

1. Test Condition

- Step 1. Charge by CC=0.2C to 4.2V and CV=4.2V till current drop to 0.02C
- Step 3. Discharge by CC=0.2C to 2.5V at -20/-10/0/25/55°C

2. Test Result

Cycle	-20℃	-10℃	0℃	25℃	55℃
Capacity (mAh)	1970	2117	2303	2540	2596
vs. 25℃	77.5%	83.3%	90.6%	100.0	102.2%



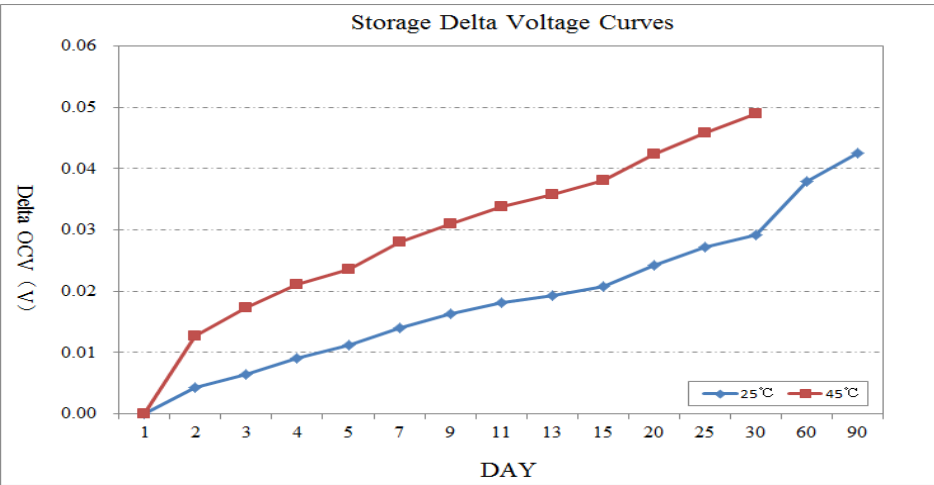
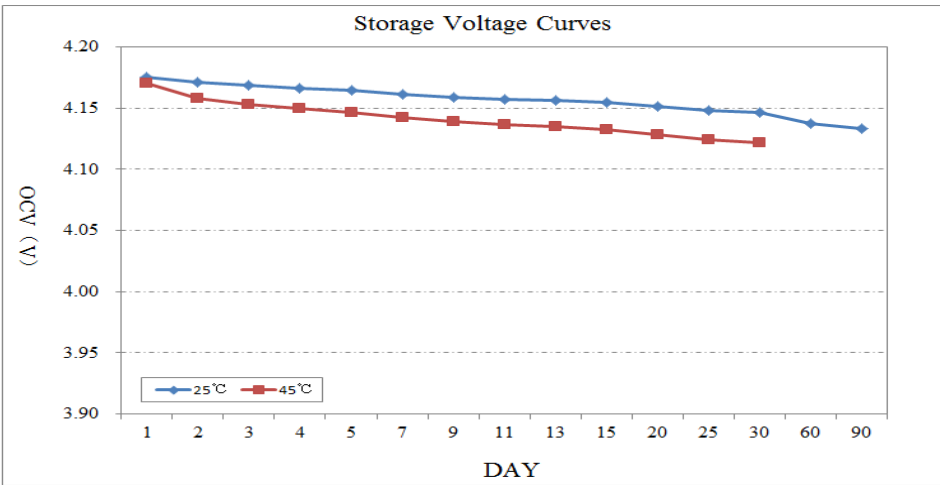
8. Storage@25/45℃

1. Test Condition

- Step 1. Charge by CC=0.5C to 4.2V , and CV=4.2V till current drop to 0.02C
- Step 2. Keep at 25/45℃
- Step 3. Test residue & recovery capacity every month

2. Test Result

Temp.	Item	0 month	1 months	2 months	3 months
25℃	Voltage (V)	4.175	4.146	4.138	4.133
	Residue Cap. Rate	100.0%	97.6%	96.6%	95.5%
	Recovery Cap. Rate	100.0%	100.0%	99.7%	99.1%
45℃	Voltage (V)	4.170	4.121	Ongoing	
	Residue Cap. Rate	100.0%	94.5%		
	Recovery Cap. Rate	100.0%	98.8%		

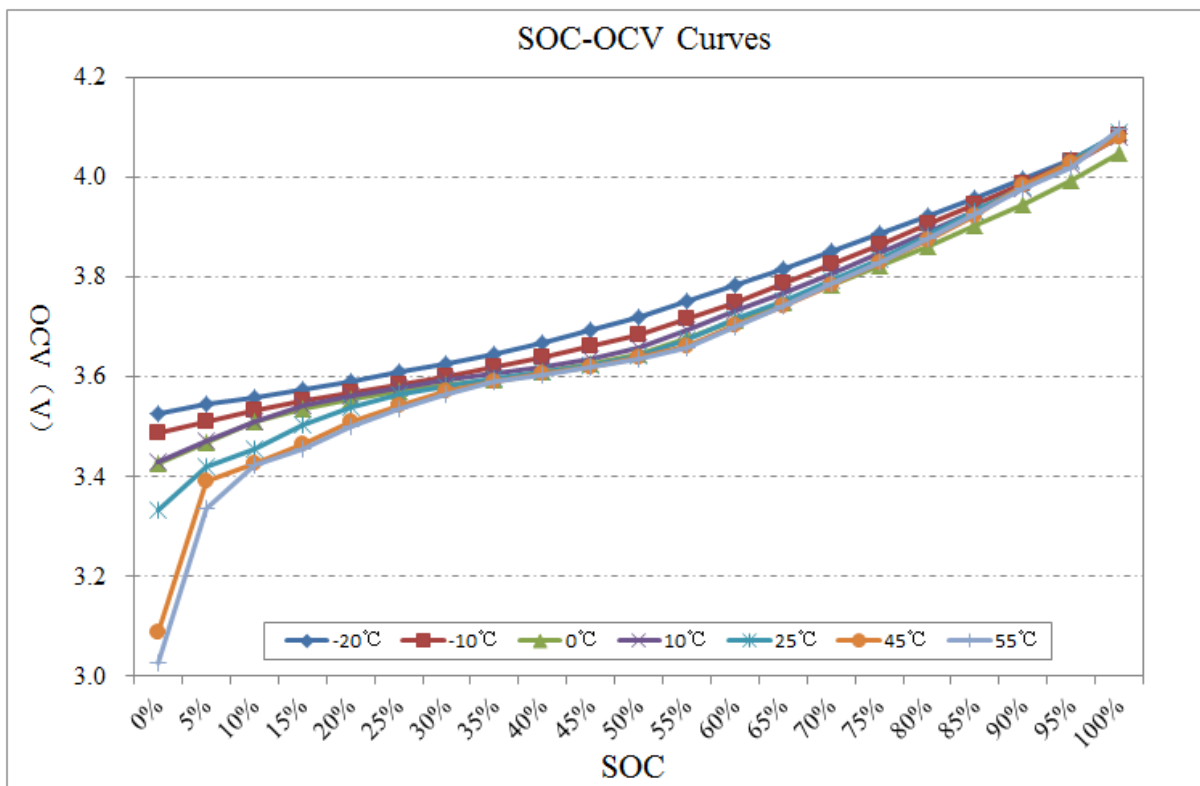


9. SOC-OCV (Discharging) @4.1~3.0V

1. Test Condition

- Step 1. Charge by CC=0.33C to 4.1V and CV=4.1V till current drop to 0.02C
- Step 2. Rest for 1H
- Step 3. Discharge by CC=0.33C to 5% capacity cut off
- Step 4. Repeat Step 2 and 3 till Voltage = 3.0V

2. Test Result



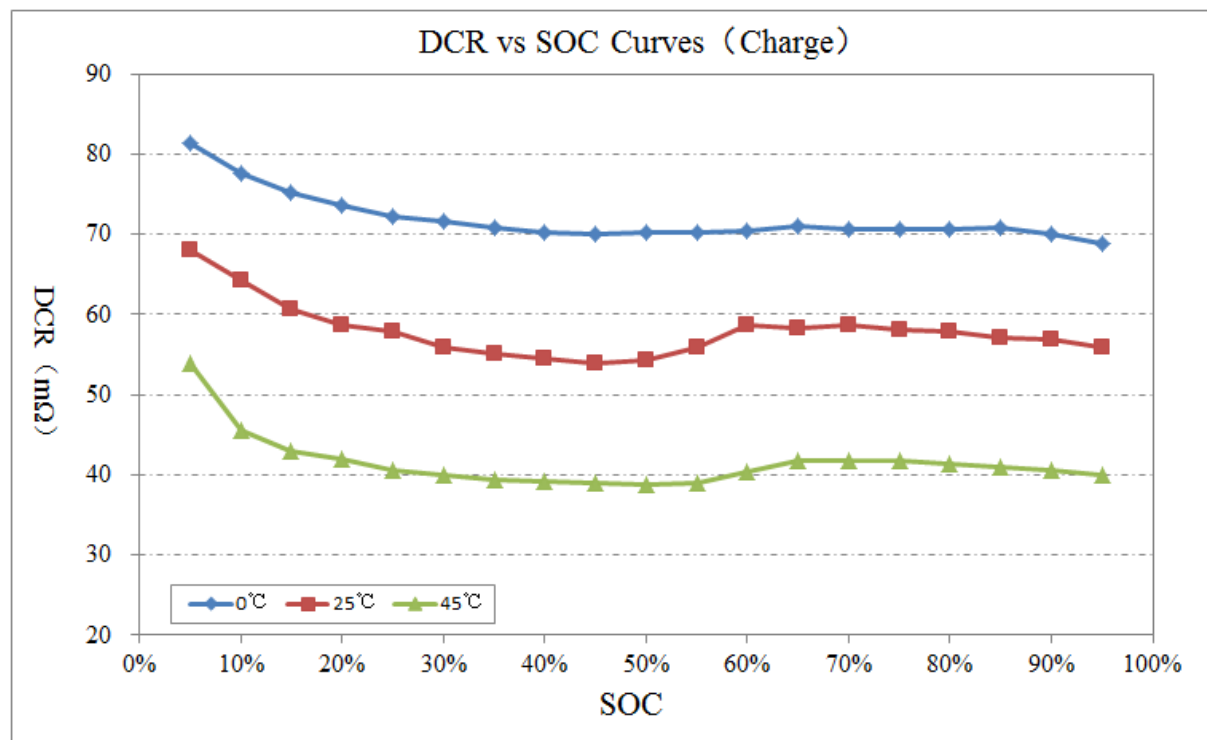
SOC	-20℃	-10℃	0℃	10℃	25℃	45℃	55℃
0%	3.528	3.489	3.426	3.431	3.332	3.089	3.027
5%	3.545	3.512	3.470	3.472	3.419	3.390	3.337
10%	3.560	3.533	3.509	3.512	3.457	3.426	3.422
15%	3.576	3.551	3.537	3.542	3.503	3.465	3.456
20%	3.592	3.568	3.555	3.563	3.539	3.509	3.502
25%	3.609	3.585	3.571	3.579	3.566	3.542	3.536
30%	3.627	3.601	3.583	3.593	3.582	3.573	3.566
35%	3.647	3.619	3.595	3.606	3.596	3.592	3.591
40%	3.669	3.638	3.609	3.621	3.609	3.606	3.605
45%	3.694	3.661	3.625	3.637	3.624	3.621	3.621
50%	3.721	3.686	3.646	3.660	3.643	3.638	3.637
55%	3.751	3.716	3.677	3.693	3.675	3.662	3.660
60%	3.784	3.750	3.714	3.732	3.717	3.705	3.699
65%	3.818	3.787	3.748	3.769	3.753	3.744	3.744
70%	3.853	3.826	3.784	3.807	3.793	3.784	3.786
75%	3.887	3.866	3.823	3.848	3.837	3.829	3.831
80%	3.922	3.906	3.863	3.891	3.884	3.876	3.878
85%	3.958	3.947	3.905	3.933	3.931	3.924	3.927
90%	3.996	3.988	3.947	3.978	3.980	3.984	3.978
95%	4.037	4.033	3.993	4.026	4.032	4.028	4.021
100%	4.086	4.085	4.047	4.080	4.092	4.082	4.097

10. DCR (Charging) @4.1~3.0V

1. Test Condition

- Step 1. Charge by CC=0.33C to 4.1V and CV=4.1V till current drop to 0.02C
- Step 2. Discharge by CC=0.33C to 5% capacity cut off and Rest for 1H
- Step 3. Discharge by CC=1C for 10s/rest for 40s/Charge by CC=0.75C for 10s
- Step 4. Repeat Step 2 to 3 till Voltage = 3.0V

2. Test Result



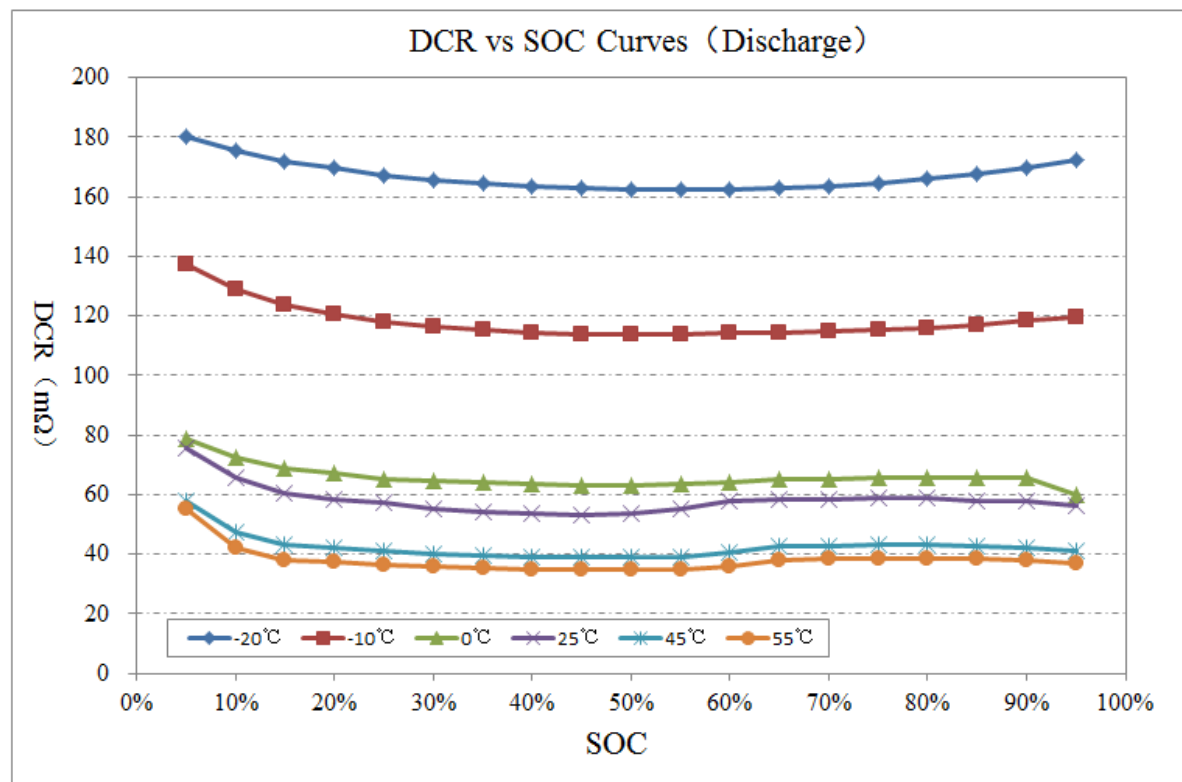
SOC	0°C	25°C	45°C
95%	68.86	55.82	40.04
90%	69.97	56.88	40.63
85%	70.90	57.05	40.98
80%	70.67	57.81	41.33
75%	70.67	58.16	41.68
70%	70.67	58.75	41.85
65%	71.08	58.22	41.68
60%	70.50	58.75	40.39
55%	70.14	55.82	38.99
50%	70.26	54.36	38.81
45%	69.97	54.01	38.93
40%	70.14	54.60	39.11
35%	70.85	55.06	39.34
30%	71.55	56.00	40.04
25%	72.31	57.81	40.57
20%	73.59	58.75	42.03
15%	75.23	60.73	42.91
10%	77.57	64.30	45.48
5%	81.37	67.98	54.01

11. DCR (Discharging) @4.1~3.0V

1. Test Condition

- Step 1. Charge by CC=0.33C to 4.1V and CV=4.1V till current drop to 0.02C
- Step 2. Discharge by CC=0.33C to 5% capacity cut off and Rest for 1H
- Step 3. Discharge by CC=0.75C for 10s/rest for 40s/Charge by CC=1C for 10s
- Step 4. Repeat Step 2 to 3 till Voltage = 3.0V

2. Test Result



SOC	-20℃	-10℃	0℃	25℃	45℃	55℃
95%	172.34	119.33	59.67	56.38	41.30	36.87
90%	169.75	118.24	65.76	57.61	42.17	37.78
85%	167.43	117.01	65.50	58.04	42.79	38.28
80%	165.85	116.05	65.54	58.70	42.92	38.49
75%	164.58	115.26	65.50	58.70	42.96	38.65
70%	163.66	114.82	65.37	58.31	42.79	38.53
65%	162.95	114.47	65.10	58.31	42.44	38.11
60%	162.56	114.03	64.31	57.65	40.46	35.91
55%	162.43	113.72	63.48	55.06	38.89	34.91
50%	162.47	113.77	63.04	53.66	39.02	34.79
45%	162.69	113.61	63.09	53.27	39.02	34.79
40%	163.48	114.47	63.35	53.57	39.15	34.91
35%	164.58	115.26	64.01	54.23	39.54	35.16
30%	165.67	116.35	64.66	55.33	40.07	35.95
25%	167.16	118.11	65.37	57.08	40.90	36.45
20%	169.49	120.43	66.99	58.31	42.00	37.36
15%	171.90	123.59	69.00	60.59	43.05	37.91
10%	175.36	128.85	72.34	65.89	47.44	42.02
5%	180.36	137.26	78.56	75.71	57.74	55.44

12. Safety Test

Item	Fire	Explore	Result	Photo
Over-charge (1C6.15V)	NO	NO	OK	
Over-discharge	NO	NO	OK	
Short (80±20mΩ)	NO	NO	OK	
Impact	NO	NO	OK	
Crush	NO	NO	OK	