1. 32140FS Specification

Item	Specification	
Model	32140FS	
Format	Cylindrical cell	
Size (Diameter* Height)	(33.2±0.2mm) * (140±0.3mm)	
Cathode/Anode material	LFP/ Graphite	
Weight	290±10g	
Nominal Capacity (0.5C/0.5C)	15Ah	
Nominal Voltage	3.2V	
ACIR（AC 1kHz, 25%SOC）	1.0 ≤ IR≤1.8mΩ	
Energy Density	165Wh/kg 396Wh/L	
Voltage Range	2.0-3.6V	
Standard Charge	0.5C CC/CV to 3.6V/0.05C, 25℃	
Standard Discharge	0.5C CC to 2.0V, 25℃	
Max. Continuous Charge	2C	
Max. Continuous Discharge	3C	
Cycle Life	2500 Cycles (25℃, 0.5C/1C, 80% SOH)	
Temperature window(cell surface)	Charge: 0~60℃	Discharge: -20~60℃
Storage temperature	-20~45℃ (3 months)	-10~25℃ (6 months)

2. 32140FS Electric Performance

Test Item	Test Method	Test Condition	Standard
2.1 SOC-DCR	2C 10s (Charge & Discharge)	25℃	/
2.2 High/Low Temperature Discharge	0.5C Charge at 25℃, 1C Discharge at different Temp.	-20/-10/0//15/25/45/55℃	55℃/25℃≥99% 0℃/25℃≥85% -10℃/25℃≥75%
2.3 C-rate Charge	0.5C Disharge, 0.33C/0.5C/0.8C/1C/1.2C/1.5C/2C/2.5C Charge	25℃	/
2.4 C-rate Discharge	0.5C Charge, 0.5C/1C/1.5C/2C/2.5C/3C Discharge	25℃	1C/0.5C≥98% 2C/0.5C≥98% 3C/0.5C≥98%
2.5 High Temperature Storage	100%SOC, 55℃ Stored for 7 days	55℃/7days	Capacity Retention≥95% Capacity Recovery≥96%
2.6 Room Temperature Storage	100%SOC, 25℃ Stored for 28 days	25℃/28days	Capacity Retention≥96% Capacity Recovery≥97%
2.7 Room Temperature Cycle	+0.5C/-1C, 2.5-3.6V	25℃	≥2500Cycle(80% SOH)
	+0.5C/-2C, 2.5-3.6V	25℃	/
	+1C/-1C, 2.5-3.6V	25℃	/
	+1C/-2C, 2.5-3.6V	25℃	≥1200Cycle(80% SOH)
	+1.2C/-1C, 2.5-3.6V	25℃	/
	+1.2C/-2C, 2.5-3.6V	25℃	≥1000Cycle(80% SOH)

2. 32140FS Electric Performance

Test Item	Test Method	Test Condition	Standard
2.7 Room Temperature Cycle	+1.5C/-2C, 2.5-3.6V	25℃	/
	+1.8C/-3C, 2.5-3.6V	25℃	/
2.8 High Temperature Cycle	+0.5C/-1C, 2.5-3.6V	45℃	/
	+0.5C/-2C, 2.5-3.6V	45℃	/
	+1C/-1C, 2.5-3.6V	45℃	/
	+1C/-2C, 2.5-3.6V	45℃	/

2.1 32140FS SOC-DCR

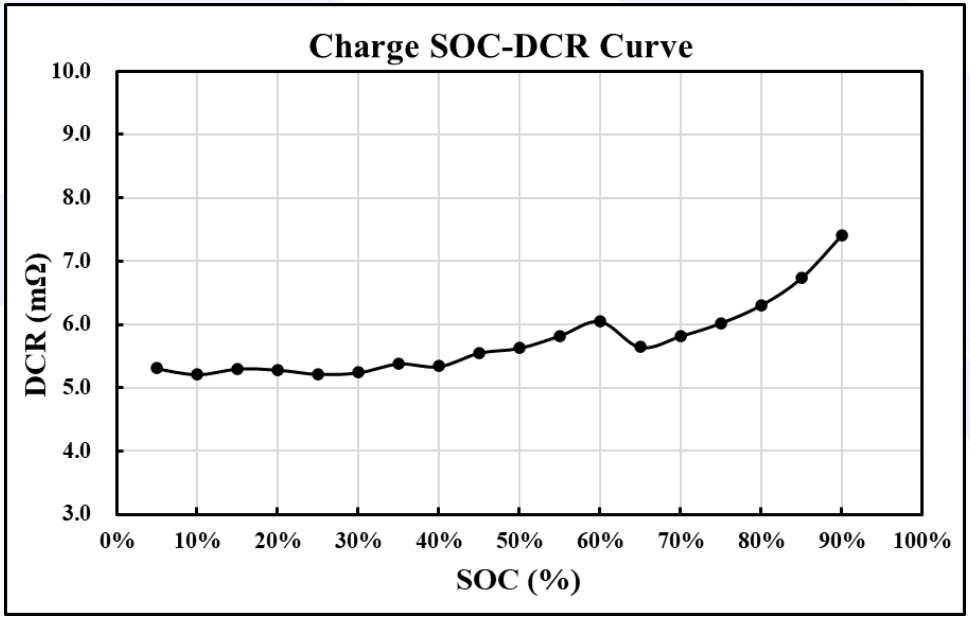
Testing method:

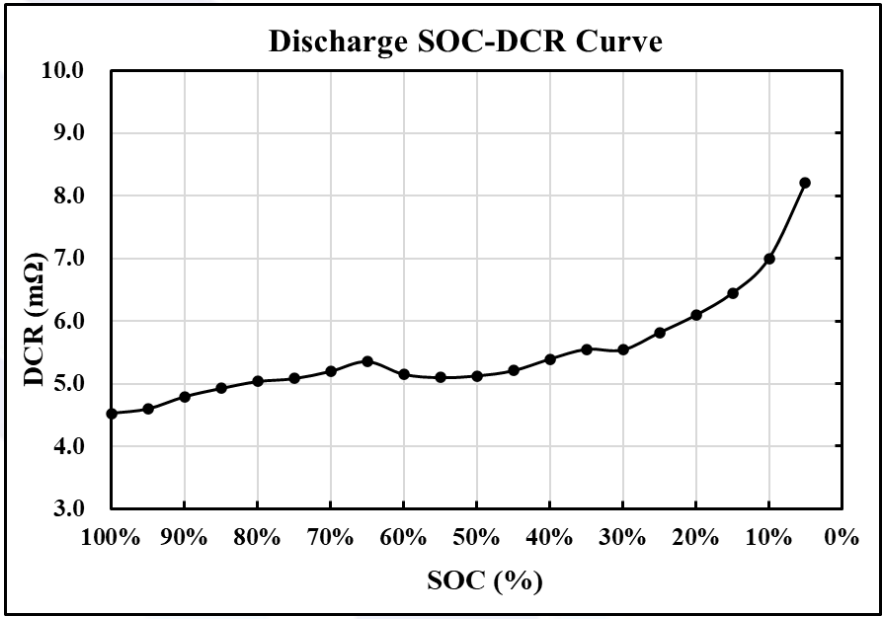
① Test condition: 25 ± 3 ℃;

② Charge DCR: Adjusting SOC state with 0.5C charge, rest for 3 hours, 2C charge for 10 seconds;

Disharge DCR: Adjusting SOC state with 0.5C discharge, rest for 3 hours, 2C discharge for 10 seconds;

③ Using the voltage at 6s to calculate the DCR;





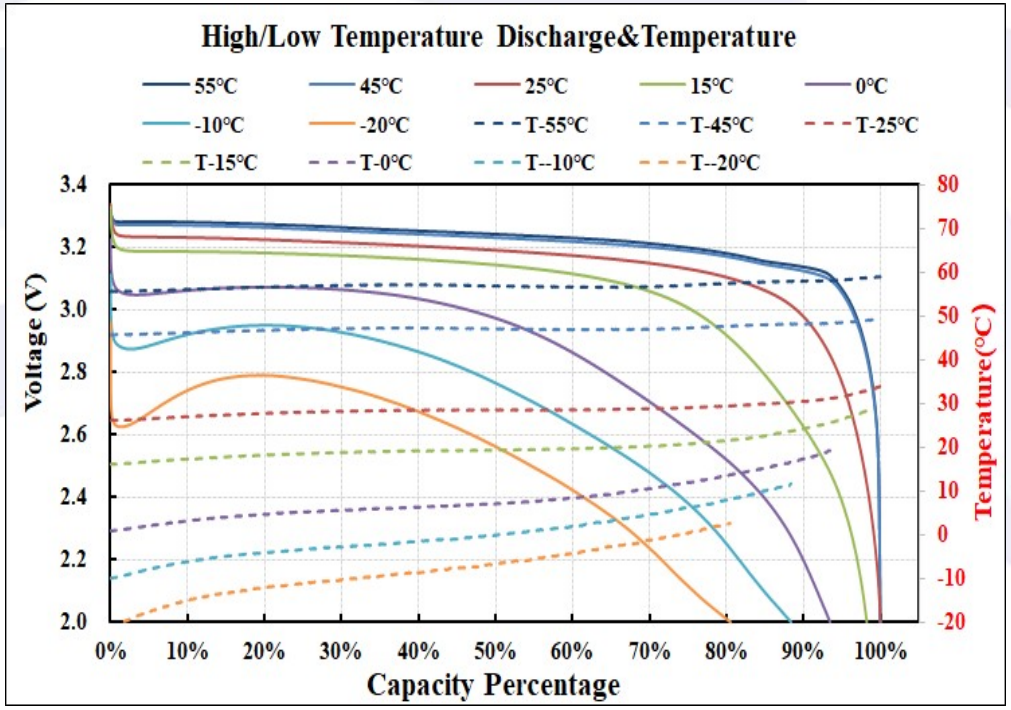
- 50% SOC charge DCR 5.6 mΩ, 50% SOC discharge DCR 5.1 mΩ.

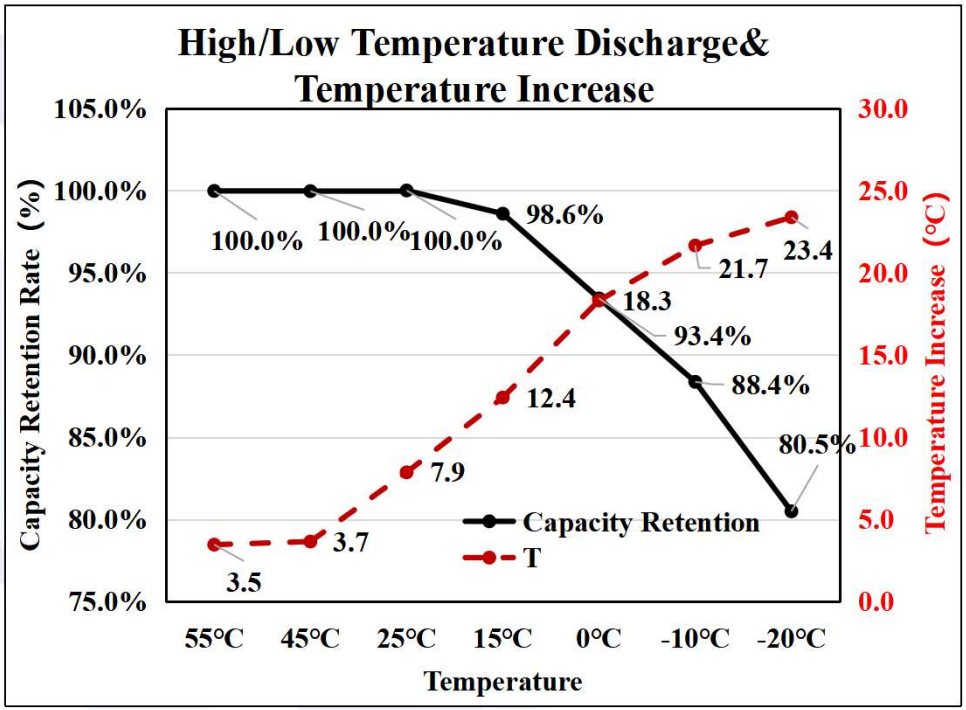
2.2 32140FS High/Low Temperature Discharge

- **Test Method:**

① **Charge: 0.5C CCCV charge to 3.6V, 0.05C cut-off at 25±3℃**

② **Discharge: 1C discharge till 2.0V at 25℃/55℃/45℃/15℃/0℃/-10℃/-20℃**





- -10℃ capacity retention ≥75%, 0℃ capacity retention ≥85%, 55℃ high temperature capacity retention ≥99%.

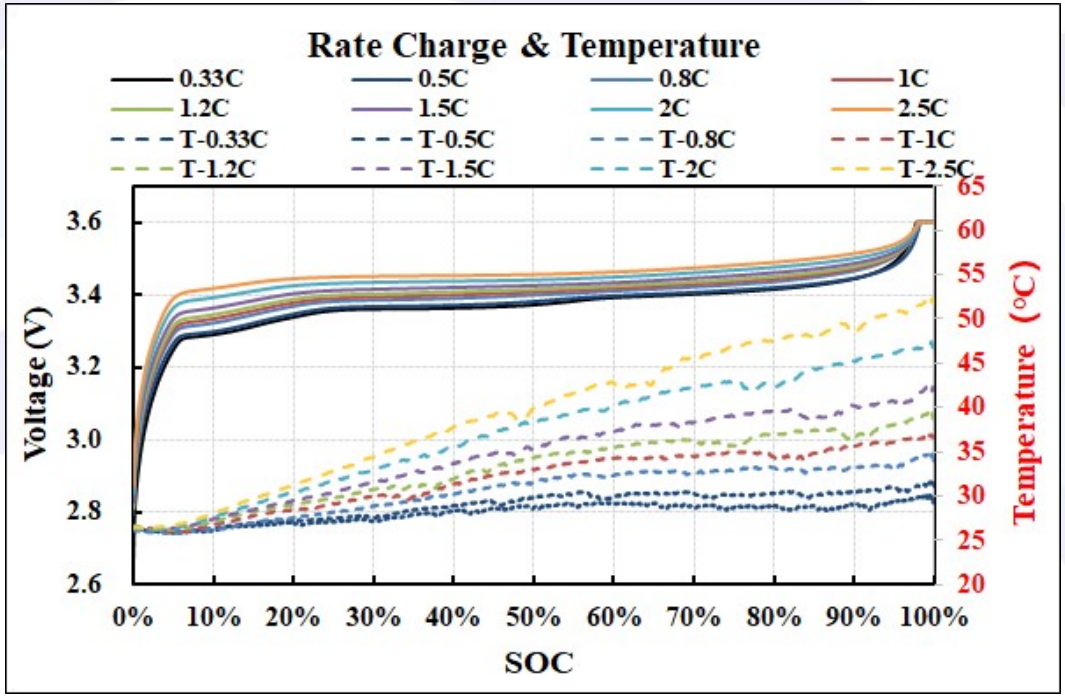
2.3 32140FS C-rate Charge

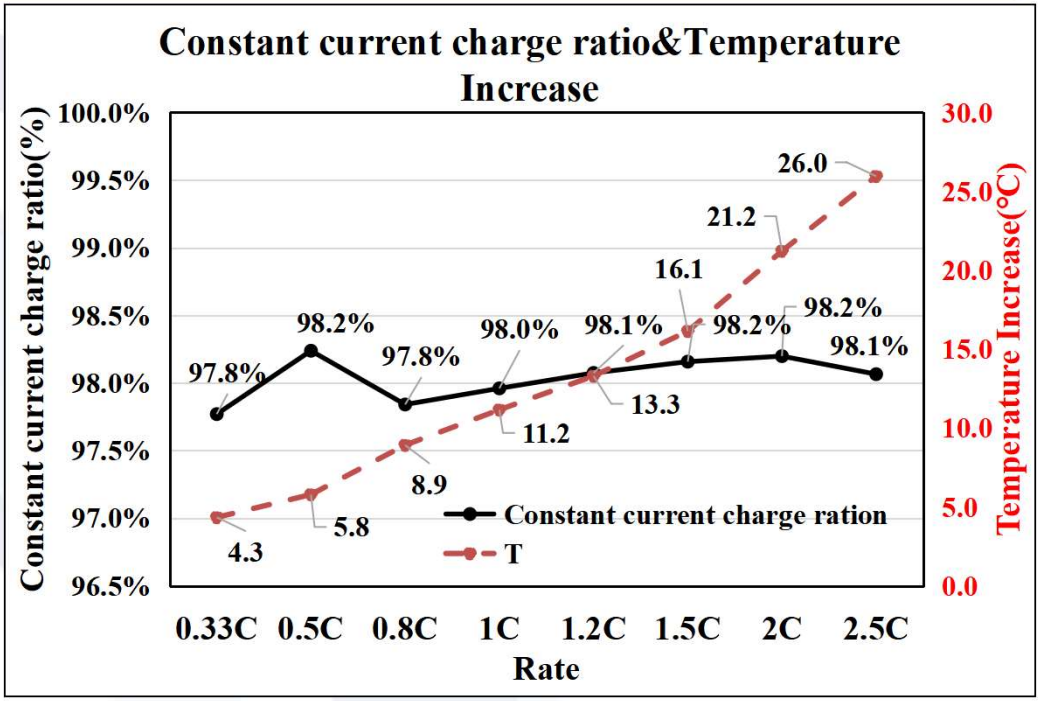
- **Test method:**

① **0.5C discharge to 2.0V, rest for 30min;**

② **nC CCCV charge to 3.6V, 0.05C cut-off, rest for 1h;**

- **Testing condition: 25±3℃.**





- The constant current charge ratio at 2C charge is about 98%, the temperature rise at 2C charge is about 21 ℃.

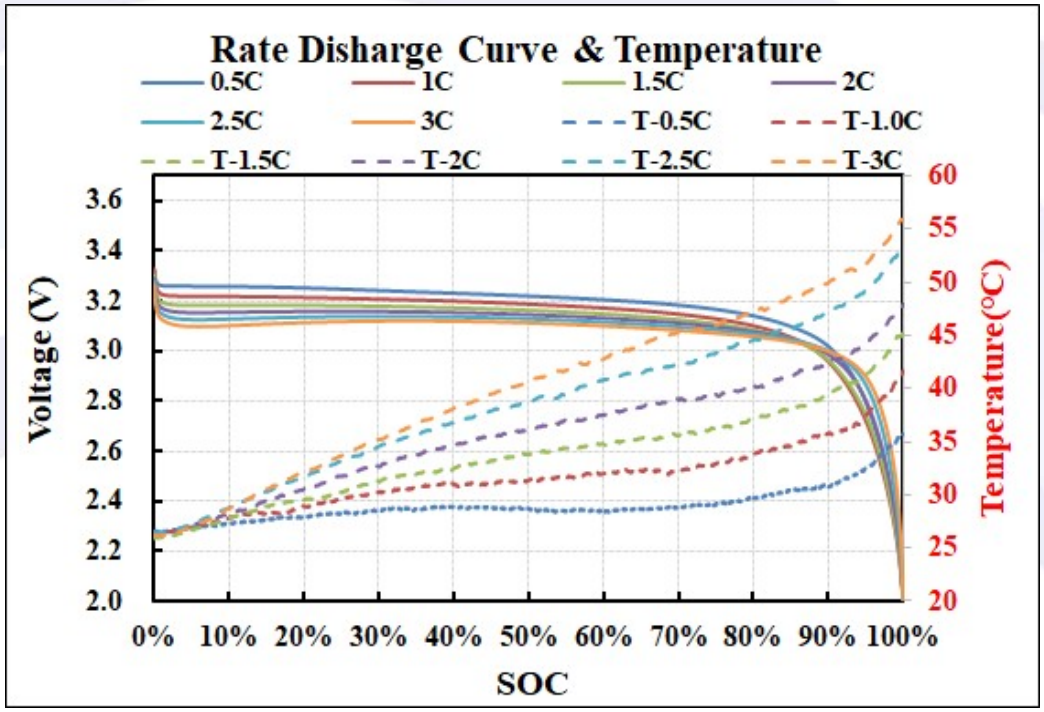
2.4 32140FS C-rate Discharge

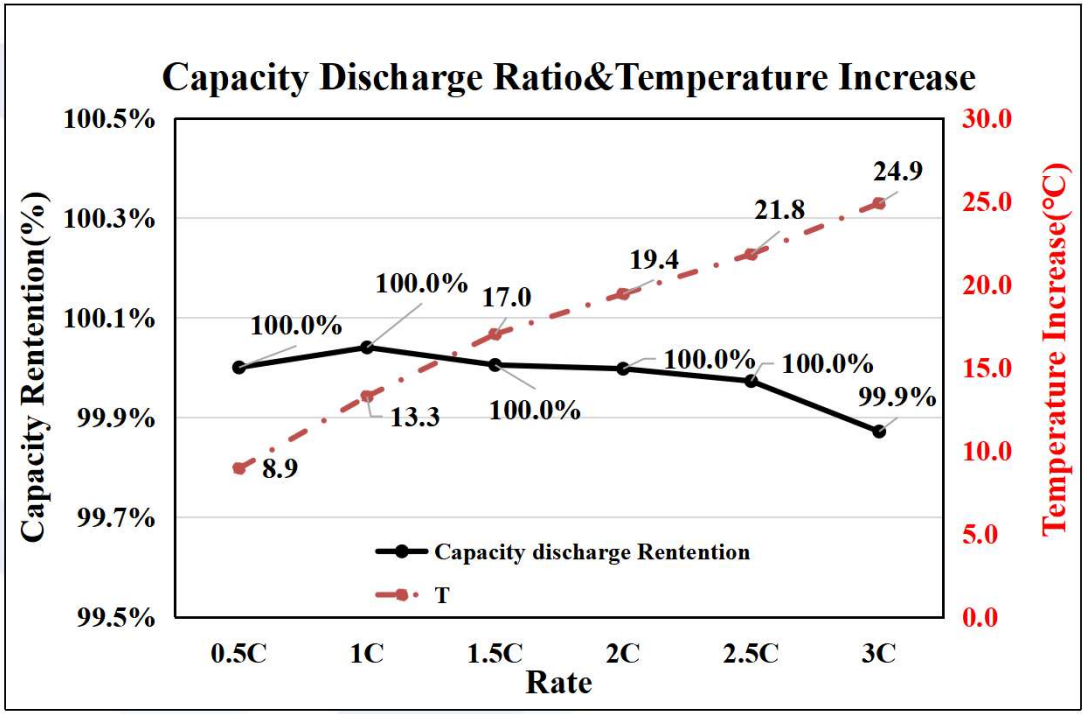
- **Testing method:**

① **0.5C CCCV charge to 3.6V, 0.05C cut-off, rest for 30min;**

② **nC discharge to 2.0V, rest for 1h;**

- **Testing condition: 25±3℃.**





- Capacity retention at all discharge rate is higher than 99%, 3C discharge temperature rise is about 25 ℃.

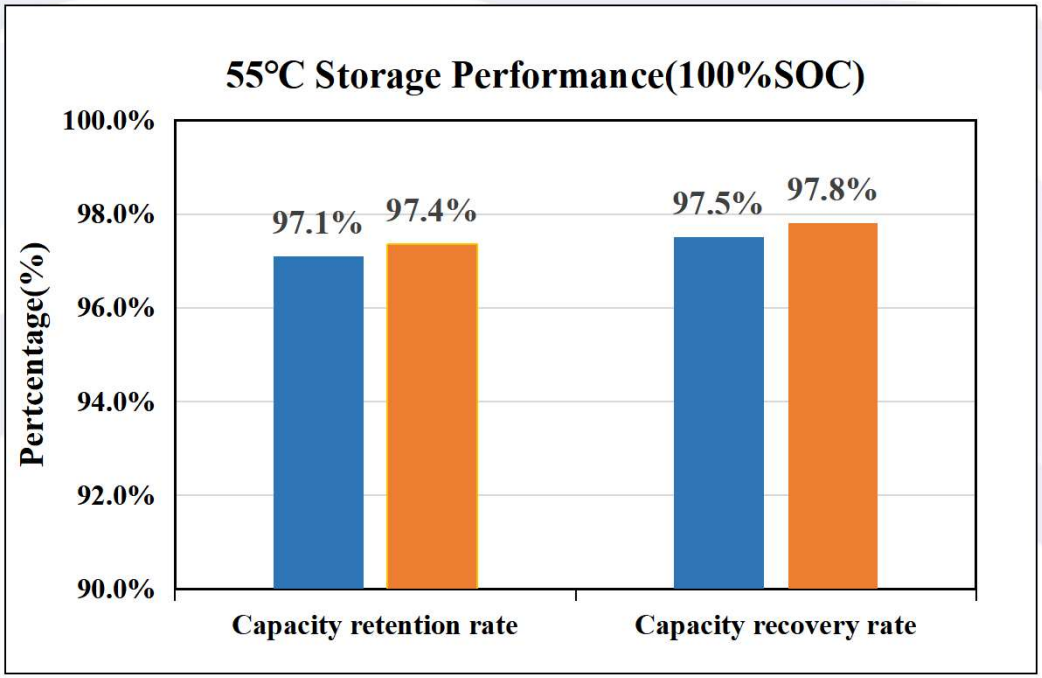
2.5 32140FS High Temperature Storage

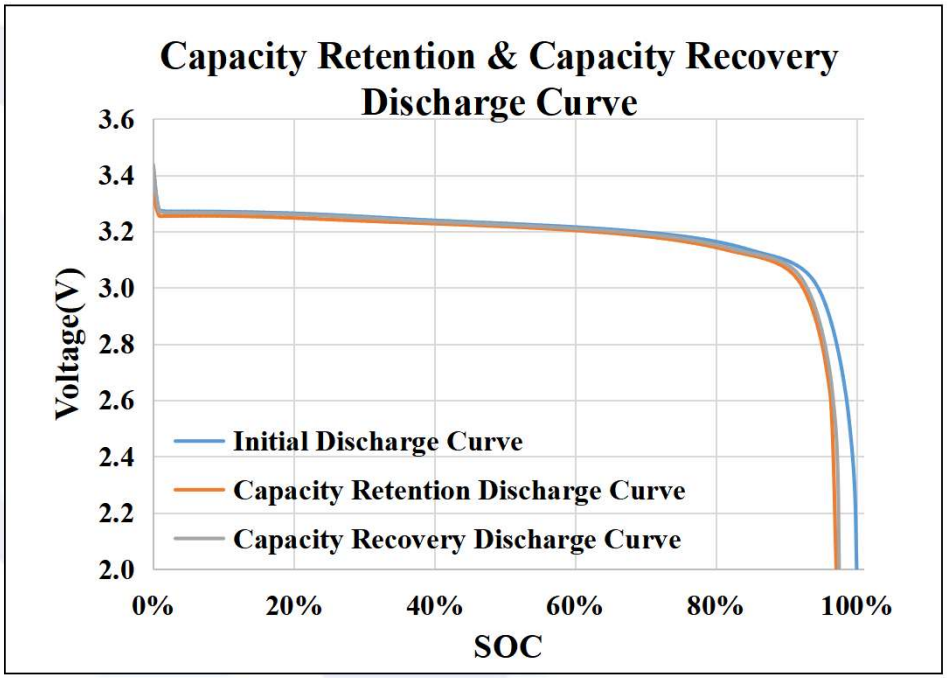
- **Testing Method:**

① 0.5C CCCV charge to 3.6V, 0.05C cut-off, stored at 55±3℃ for 7 days;

② 0.5C discharge to 2.0V, obtain retention capacity;

③ 0.5C CCCV charge to 3.6V, 0.05C cut-off, 0.5C discharge to 2.0V, obtain recovery capacity;





- Stored @ 55±2℃ for 7 days, capacity retention ≥95%, capacity recovery ≥96%.

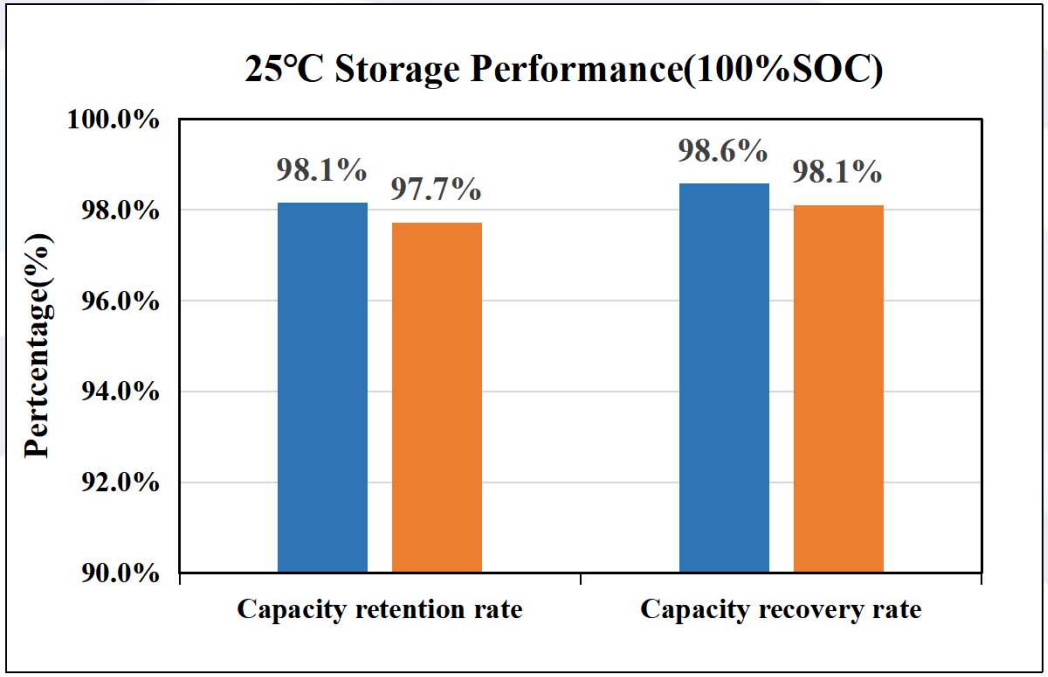
2.6 32140FS Room Temperature Storage

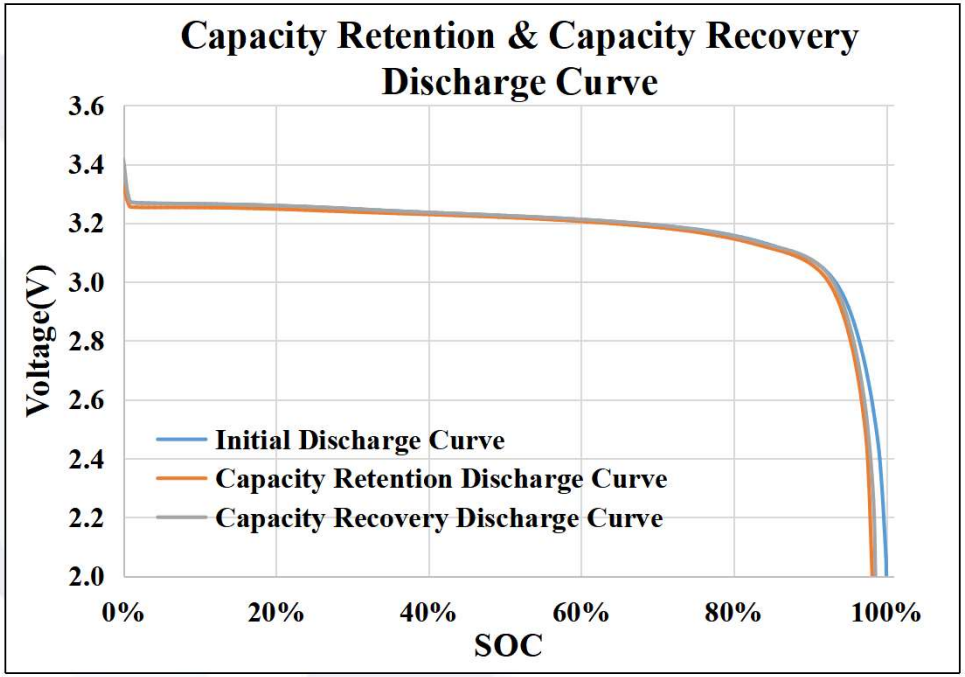
Testing Method:

① 0.5C CCCV charge to 3.6V, 0.05C cut-off, stored at 25±3℃ for 28days;

② 0.5C discharge to 2.0V, obtain retention capacity;

③ 0.5C CCCV charge to 3.6V, 0.05C cut-off, 0.5C discharge to 2.0V, obtain recovery capacity;





Stored @ 25±2℃ for 28days, capacity retention ≥96%, capacity recovery ≥97%.

2.7 32140FS Room Temperature Cycle

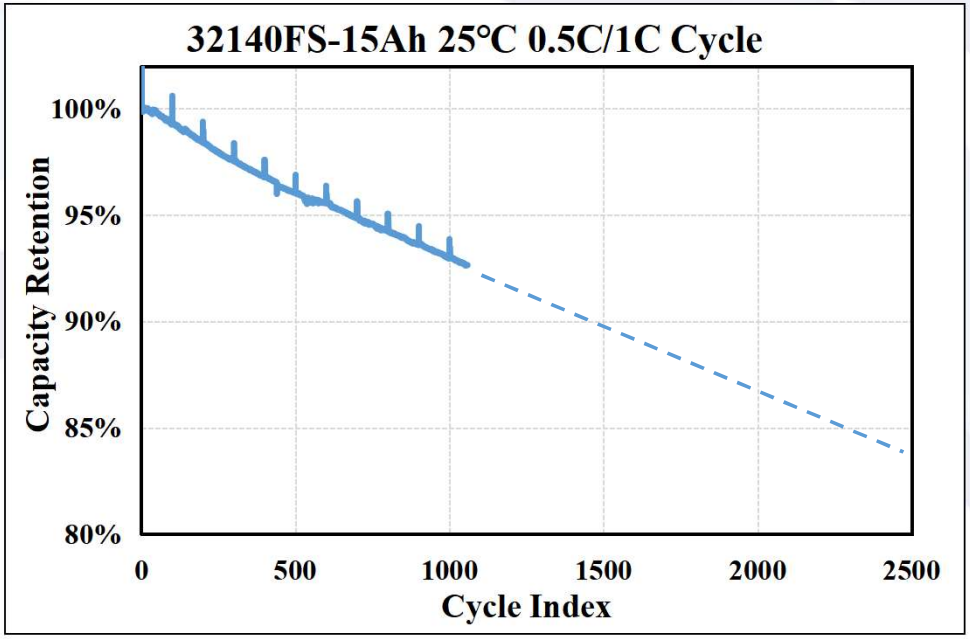
Testing method:

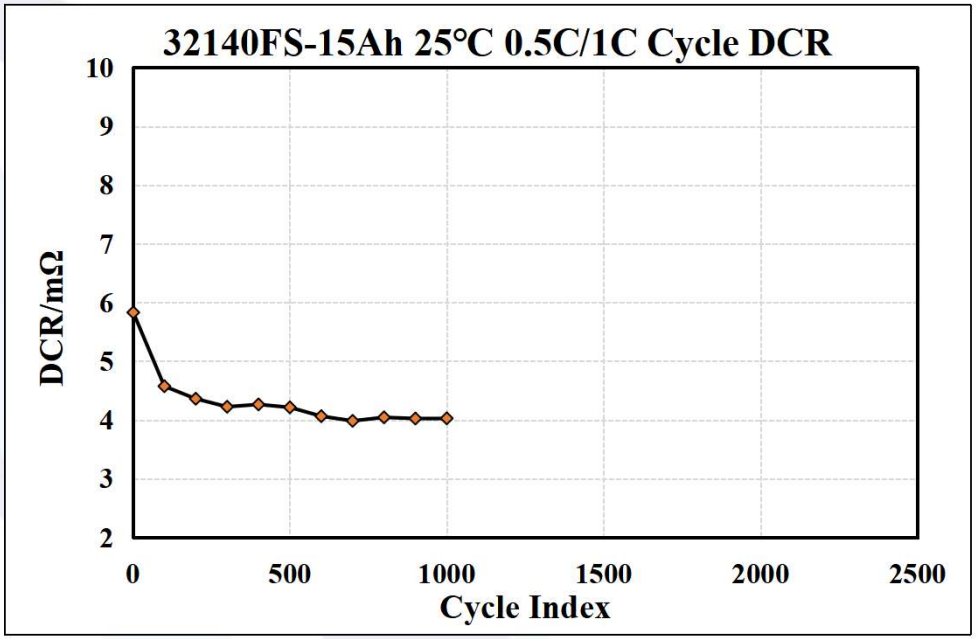
① 0.5C CCCV charge to 3.6V, 0.05C cut-off, rest for 30min;

② 1C discharge to 2.5V, rest for 30min;

③ Test 50%SOC DCR every hundred Cycles (2C 10s)

Test condition: 25±3℃





The capacity reducing trend @25℃ is stable, 0.5C/1C cycling life ≈**2500 cycles** (80%SOH).

2.7 32140FS Room Temperature Cycle

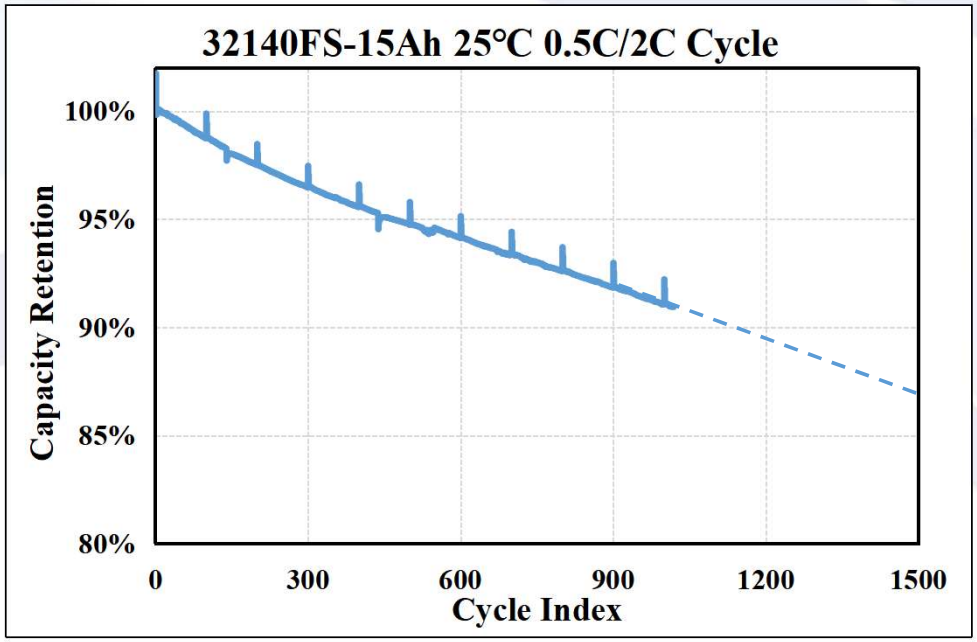
Testing method:

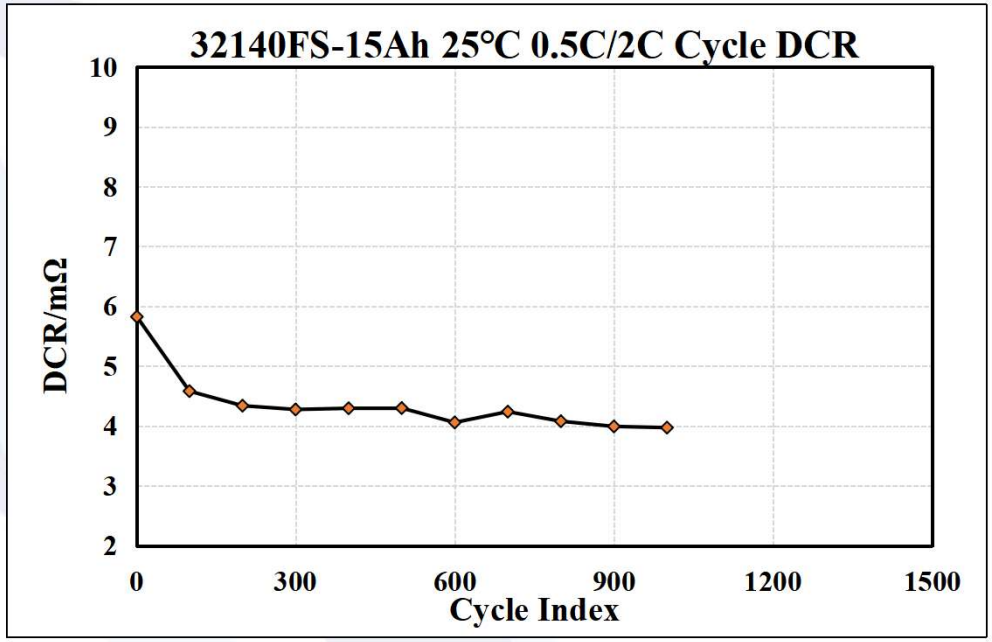
① 0.5C CCCV charge to 3.6V, 0.05C cut-off, rest for 30min;

② 2C discharge to 2.5V, rest for 1h;

③ Test 50%SOC DCR every hundred Cycles (2C 10s)

Test condition: 25±3℃





The capacity reducing trend @25℃ is stable, 0.5C/2C cycling life > **1300 cycles** (80%SOH).

2.7 32140FS Room Temperature Cycle

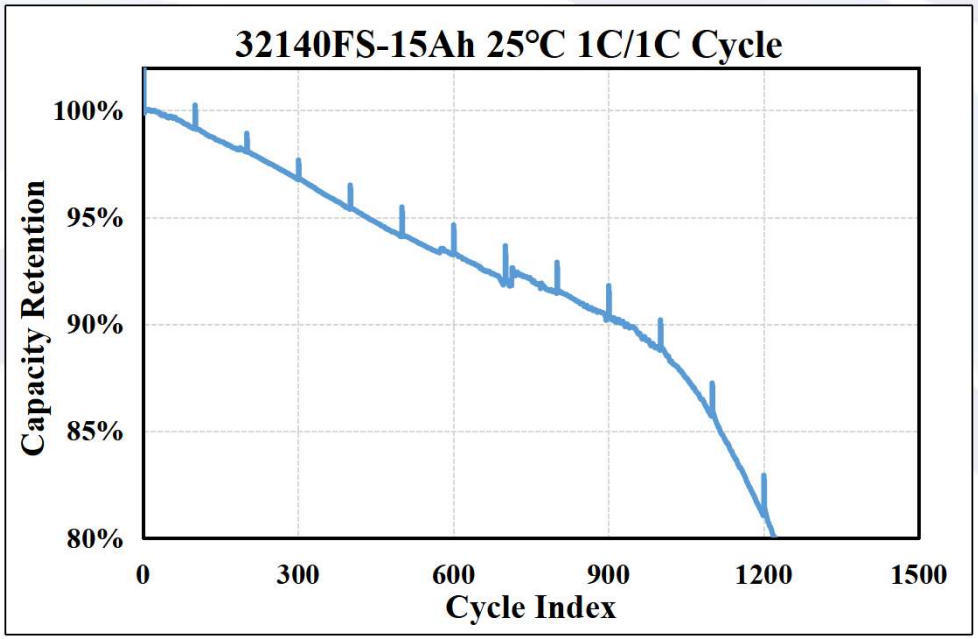
Testing method:

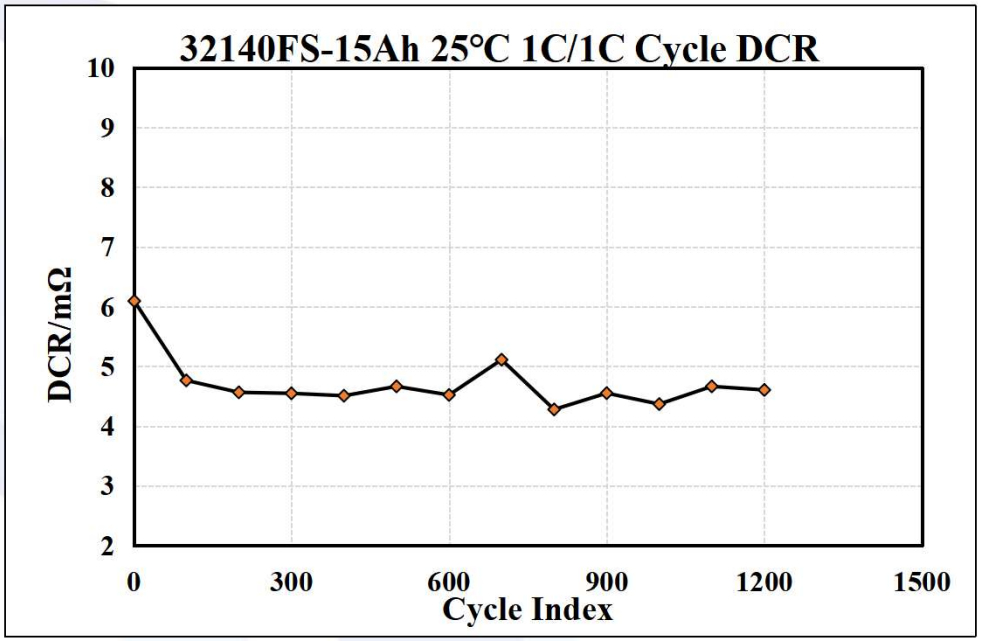
① 1C CCCV charge to 3.6V, 0.05C cut-off, rest for 30min;

② 1C discharge to 2.5V, rest for 30min;

③ Test 50%SOC DCR every hundred Cycles (2C 10s)

Test condition: 25±3℃





The capacity reducing trend @25℃ is stable, 1C/1C cycling life ≈**1200 cycles** (80%SOH).

2.7 32140FS Room Temperature Cycle

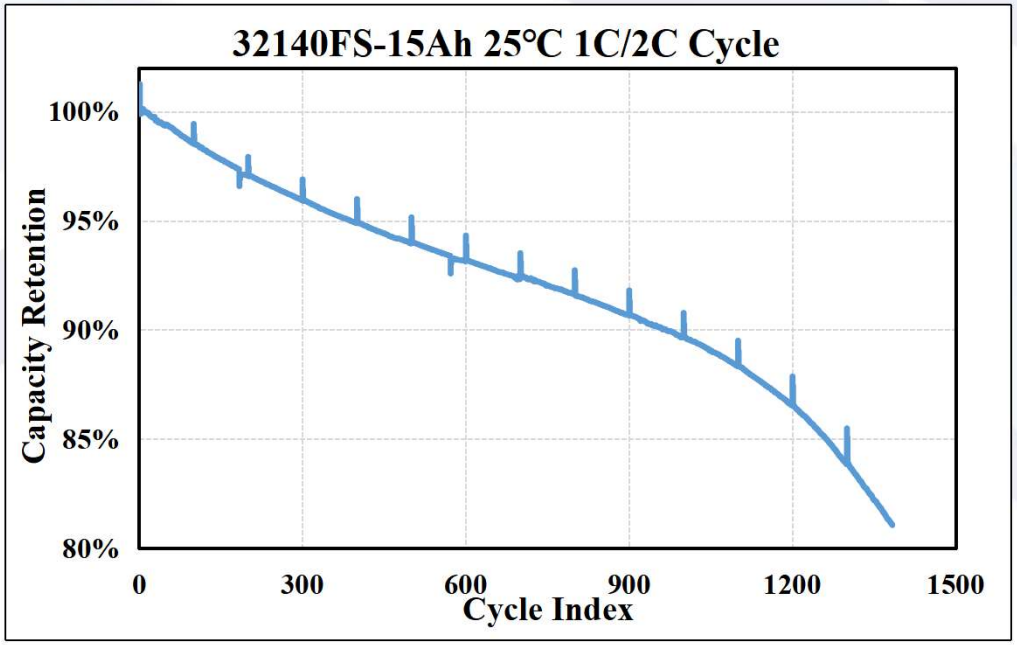
Testing method:

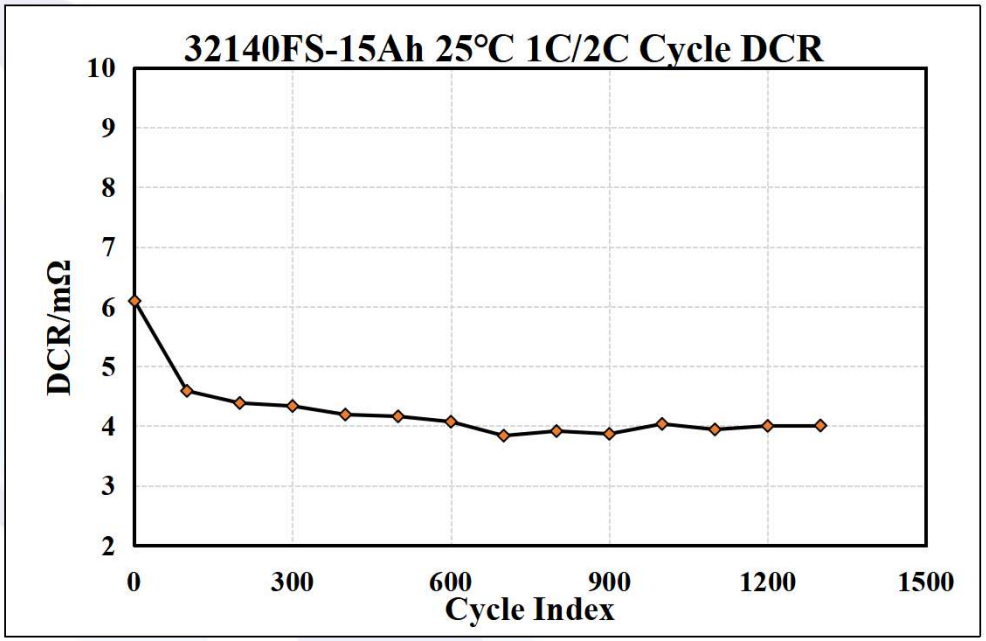
① 1C CCCV charge to 3.6V, 0.05C cut-off, rest for 30min;

② 2C discharge to 2.5V, rest for 1h;

③ Test 50%SOC DCR every hundred Cycles (2C 10s)

Test condition: 25±3℃





The capacity reducing trend @25℃ is stable, 1C/2C cycling life≈**1350 cycles** (80%SOH).

2.7 32140FS Room Temperature Cycle

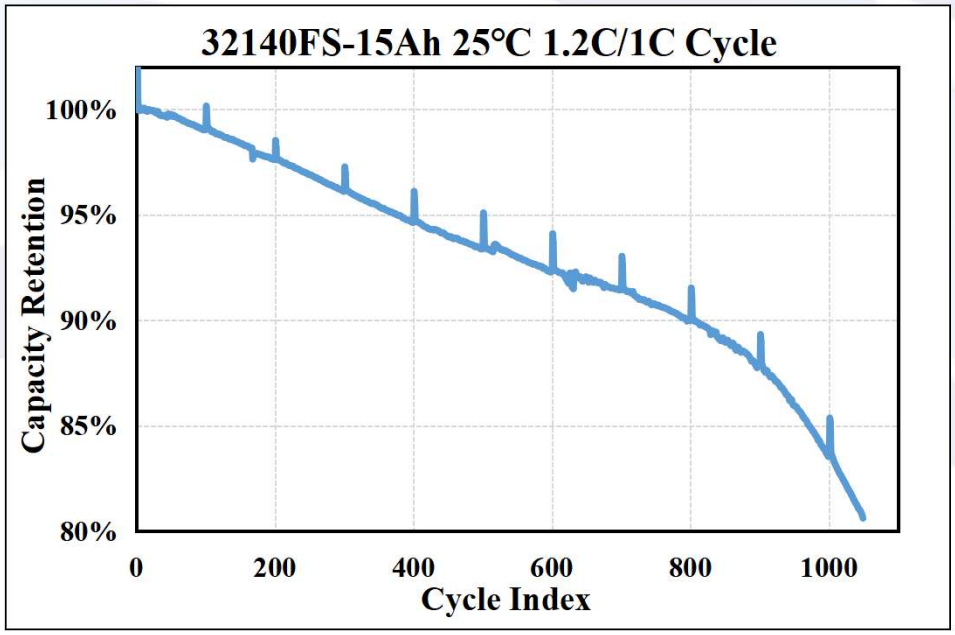
Testing method:

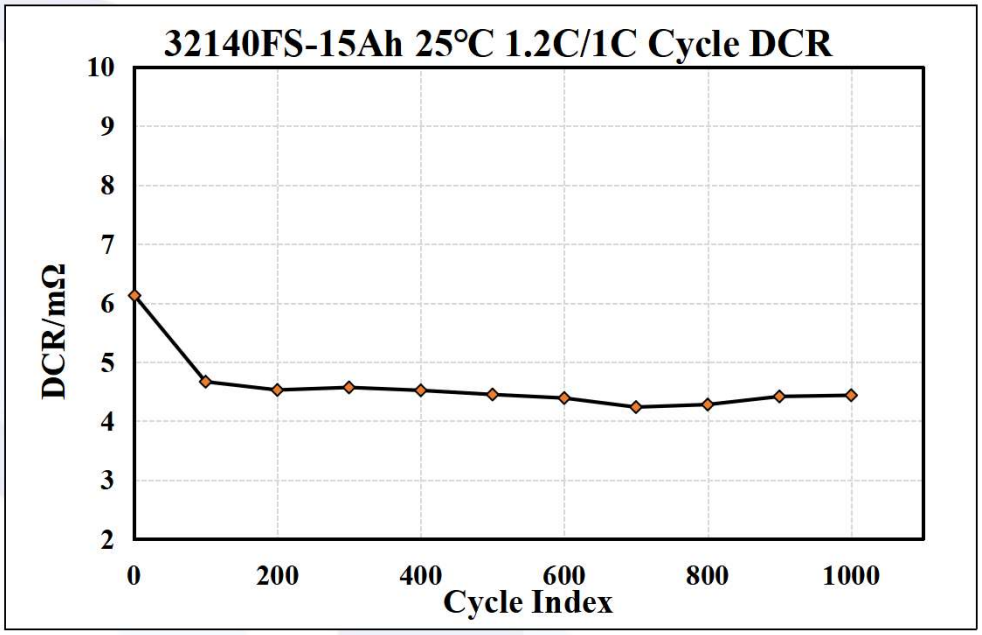
① 1.2C CCCV charge to 3.6V, 0.05C cut-off, rest for 30min;

② 1C discharge to 2.5V, rest for 30min;

③ Test 50%SOC DCR every hundred Cycles (2C 10s)

Test condition: 25±3℃





The capacity reducing trend @25℃ is stable, 1.2C/1C cycling life ≈**1050 cycles** (80%SOH).

2.7 32140FS Room Temperature Cycle

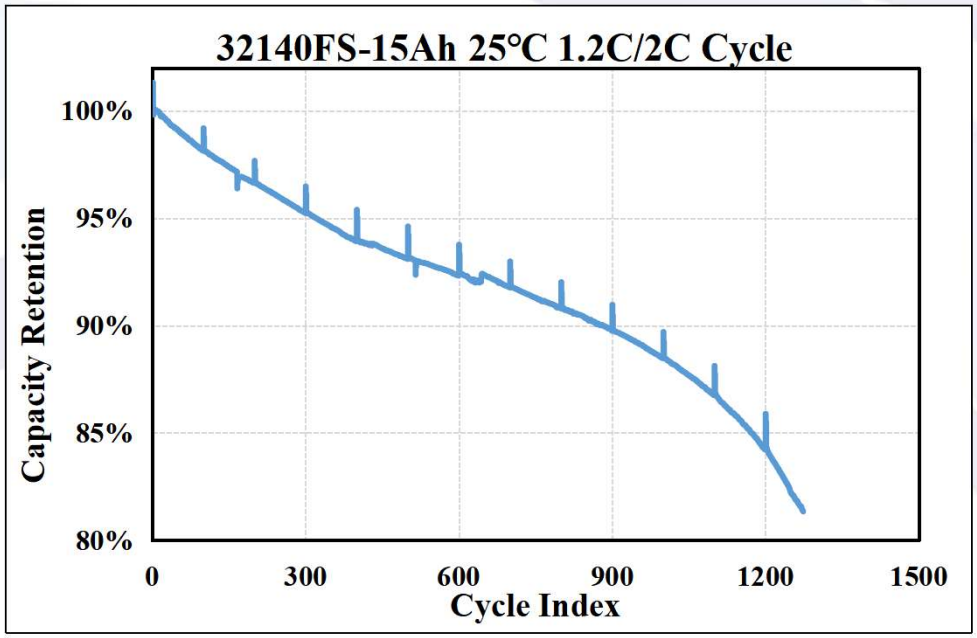
Testing method:

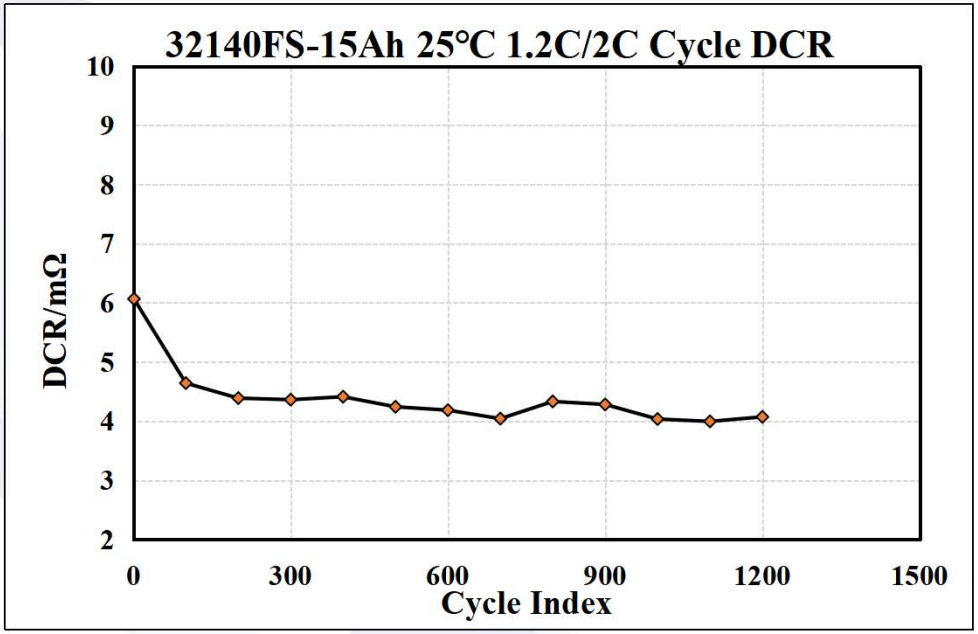
① 1.2C CCCV charge to 3.6V, 0.05C cut-off, rest for 1h;

② 2C discharge to 2.5V, rest for 1h;

③ Test 50%SOC DCR every hundred Cycles (2C 10s)

Test condition: 25±3℃





The capacity reducing trend @25℃ is stable, 1.2C/2C cycling life ≈**1300 cycles** (80%SOH).

2.7 32140FS Room Temperature Cycle

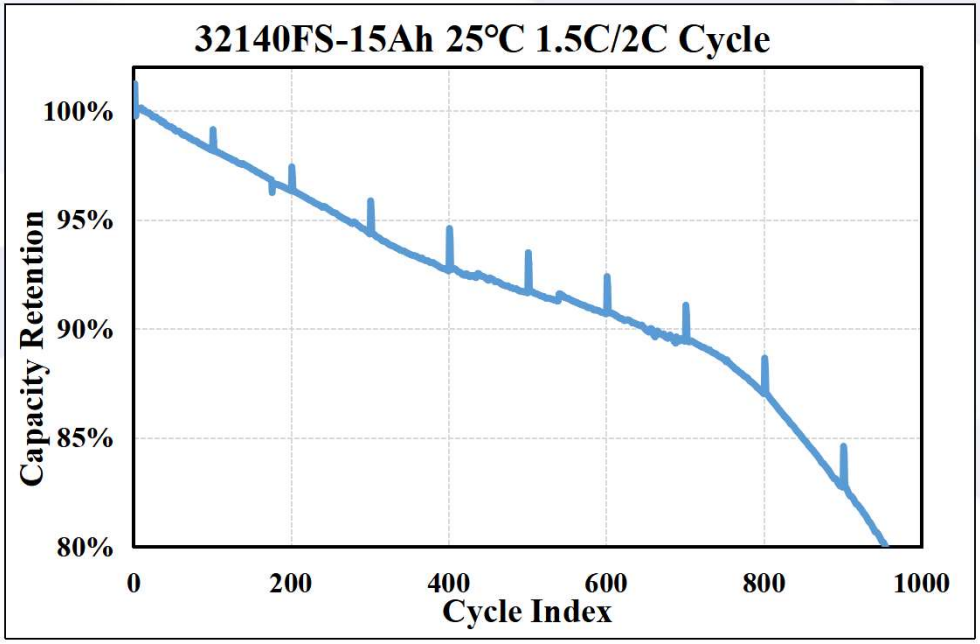
Testing method:

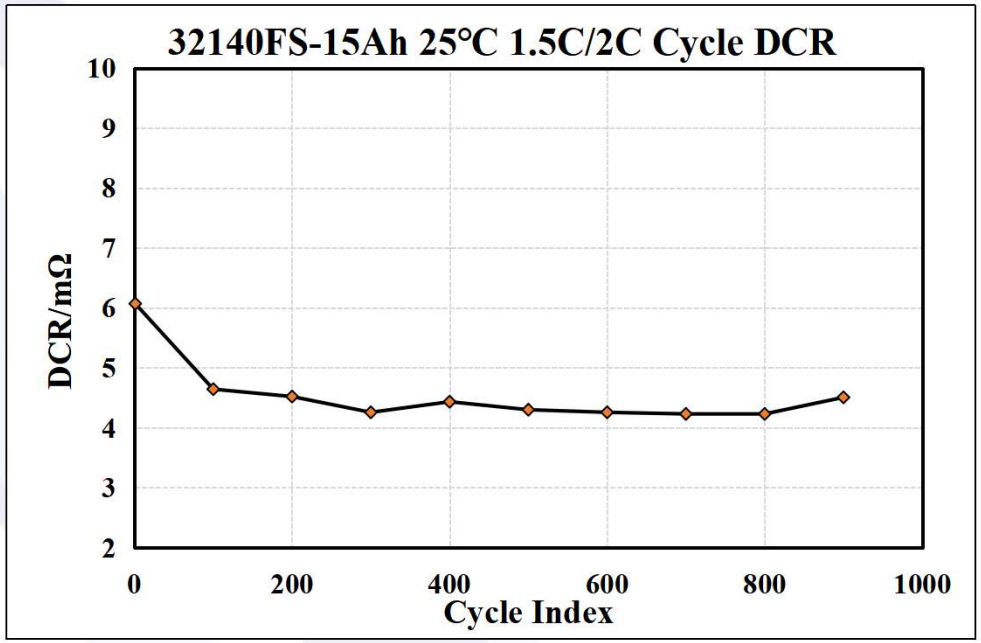
① 1.5C CCCV charge to 3.6V, 0.05C cut-off, rest for 1h;

② 2C discharge to 2.5V, rest for 1h;

③ Test 50%SOC DCR every hundred Cycles (2C 10s)

Test condition: 25±3℃





The capacity reducing trend @25℃ is stable, 1.5C/2C cycling life ≈ **950 cycles** (80%SOH).

2.7 32140FS Room Temperature Cycle

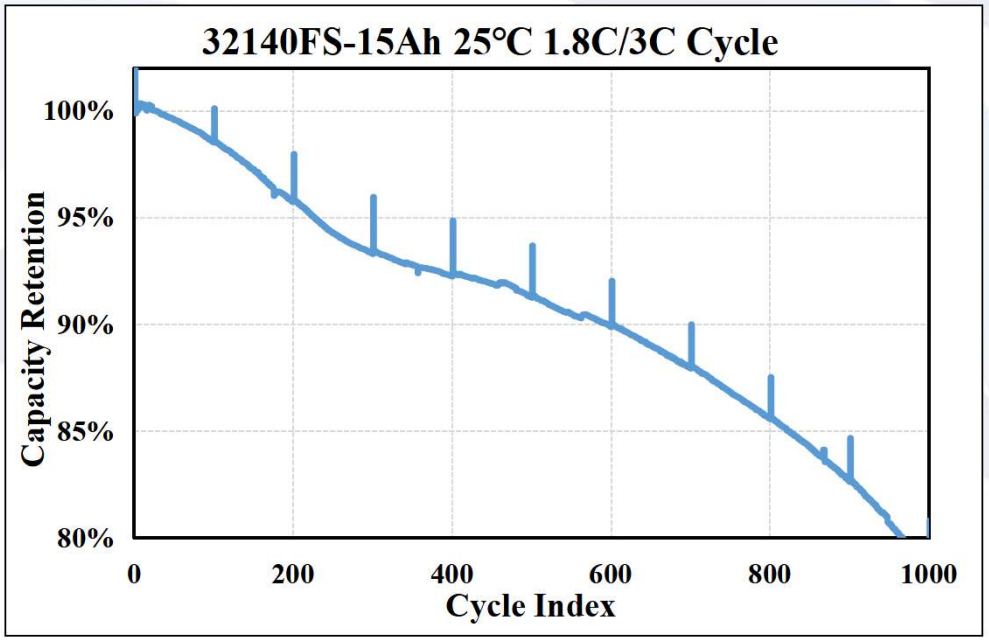
Testing method:

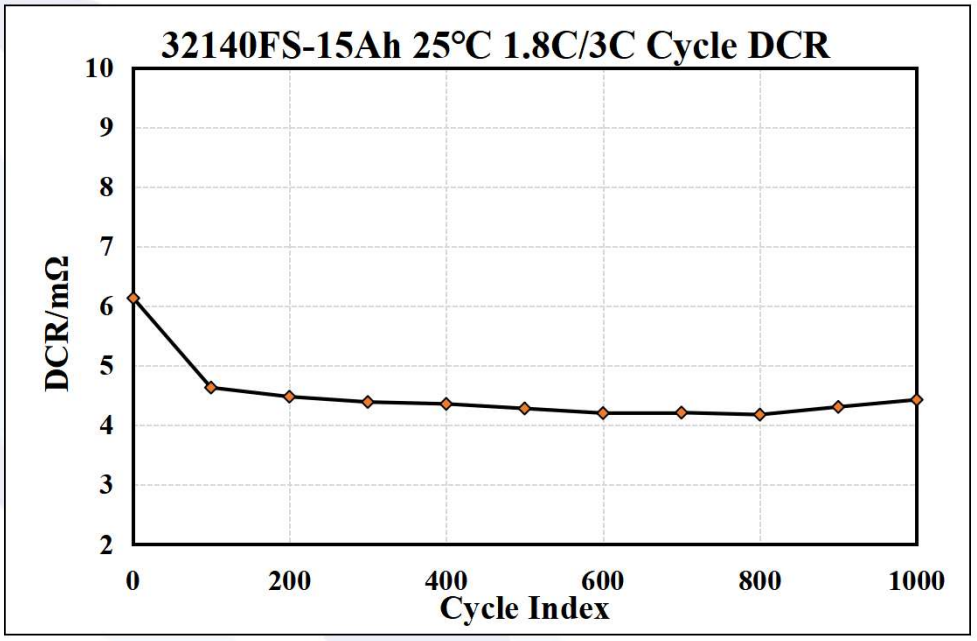
① 1.8C CCCV charge to 3.6V, 0.05C cut-off, rest for 1h;

② 3C discharge to 2.5V, rest for 1h;

③ Test 50%SOC DCR every hundred Cycles (2C 10s)

Test condition: 25±3℃





The capacity reducing trend @25℃ is stable, 1.8C/3C cycling life **≈950 cycles** (80%SOH).

2.8 32140FS High Temperature Cycle

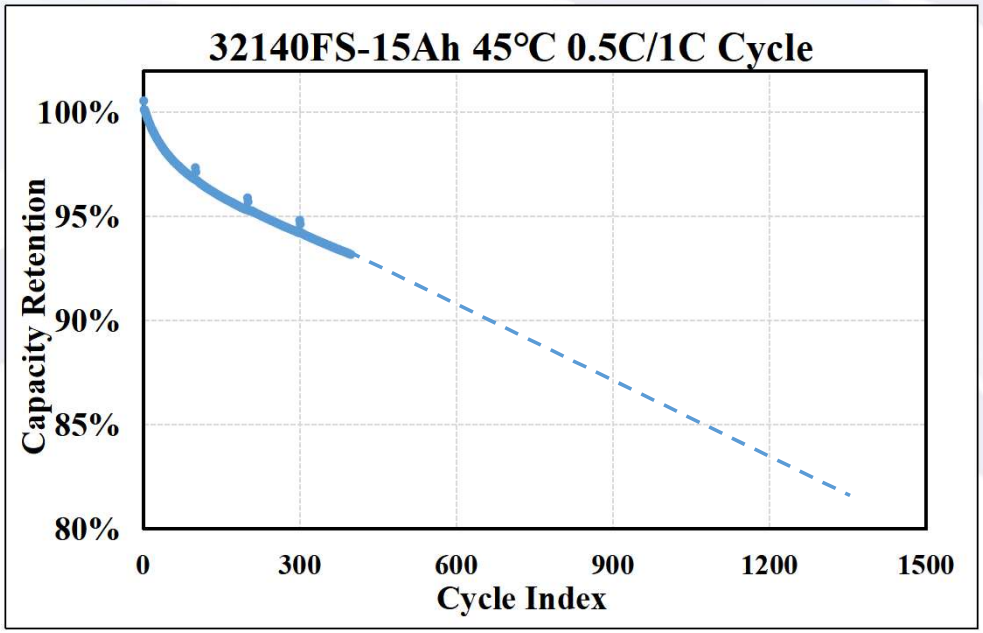
Testing method:

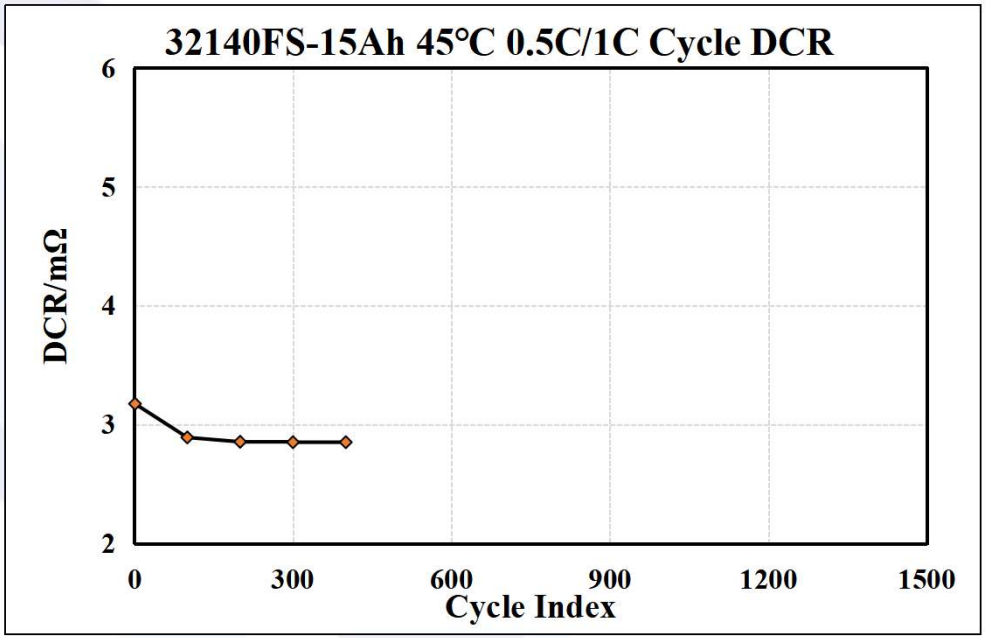
① 0.5C CCCV charge to 3.6V, 0.05C cut-off, rest for 30min;

② 1C discharge to 2.5V, rest for 30min;

③ Test 50%SOC DCR every hundred Cycles (2C 10s)

Test condition: 45±3℃





The capacity reducing trend @45℃ is stable, 0.5C/1C cycling life > **1200 cycles** (80%SOH).

2.8 32140FS High Temperature Cycle

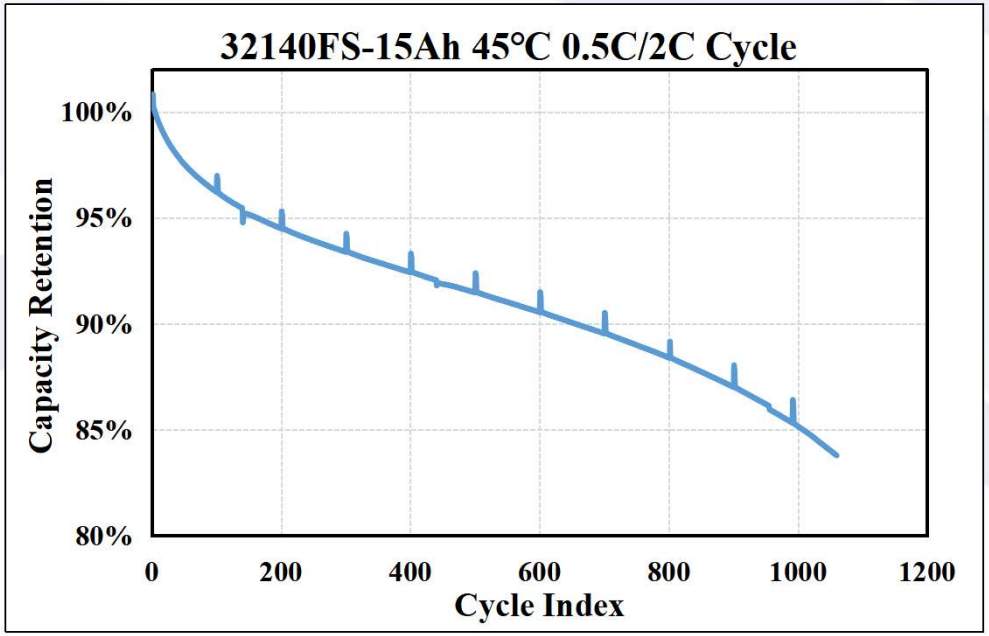
Testing method:

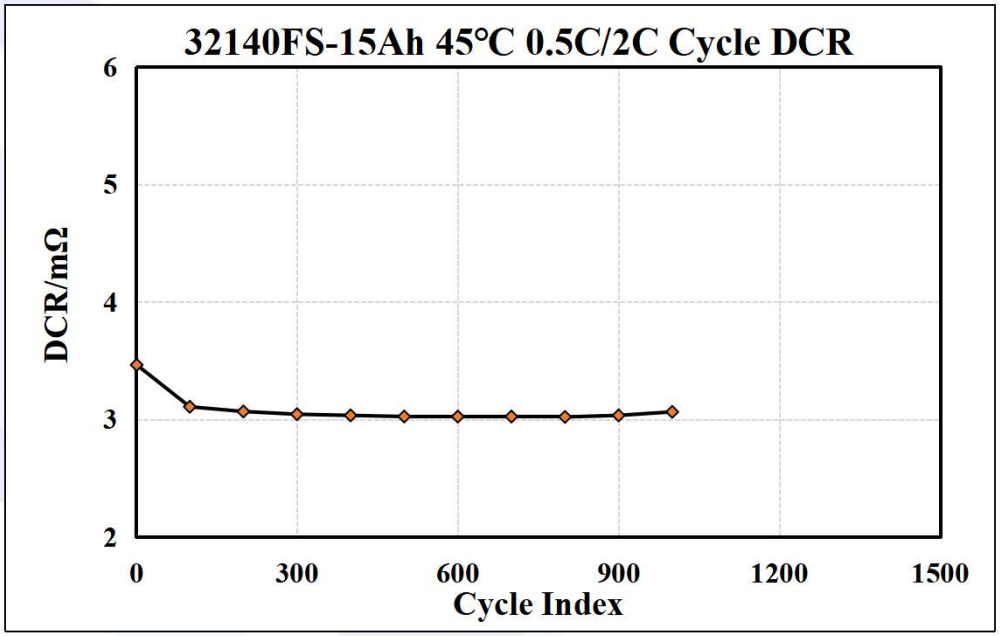
① 0.5C CCCV charge to 3.6V, 0.05C cut-off, rest for 30min;

② 2C discharge to 2.5V, rest for 1h;

③ Test 50%SOC DCR every hundred Cycles (2C 10s)

Test condition: 45±3℃





The capacity reducing trend @45℃ is stable, 0.5C/2C cycling life ≈ **1100 cycles** (80%SOH).

2.8 32140FS High Temperature Cycle

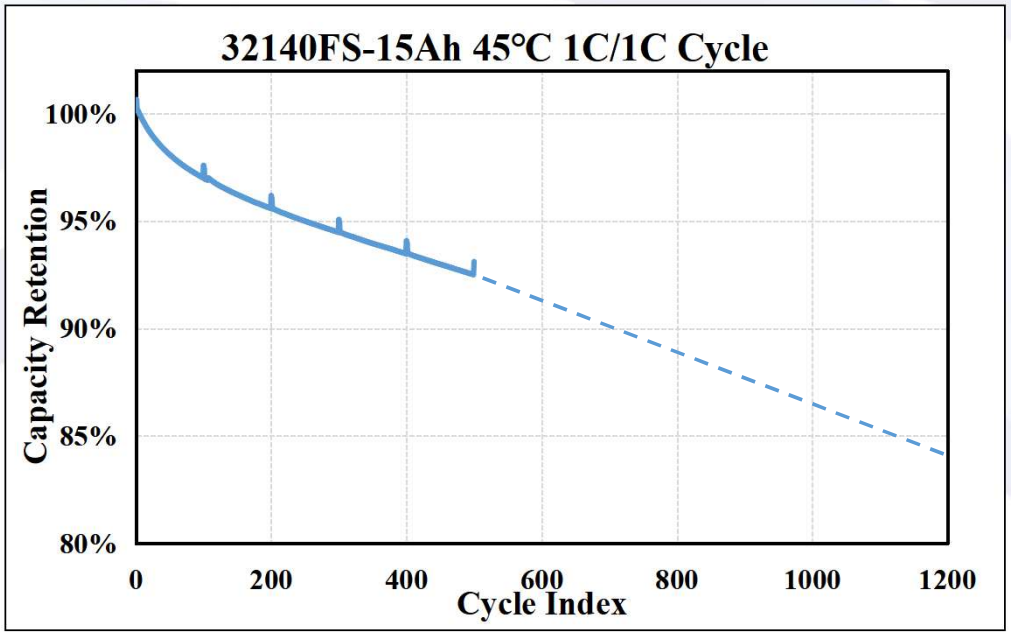
Testing method:

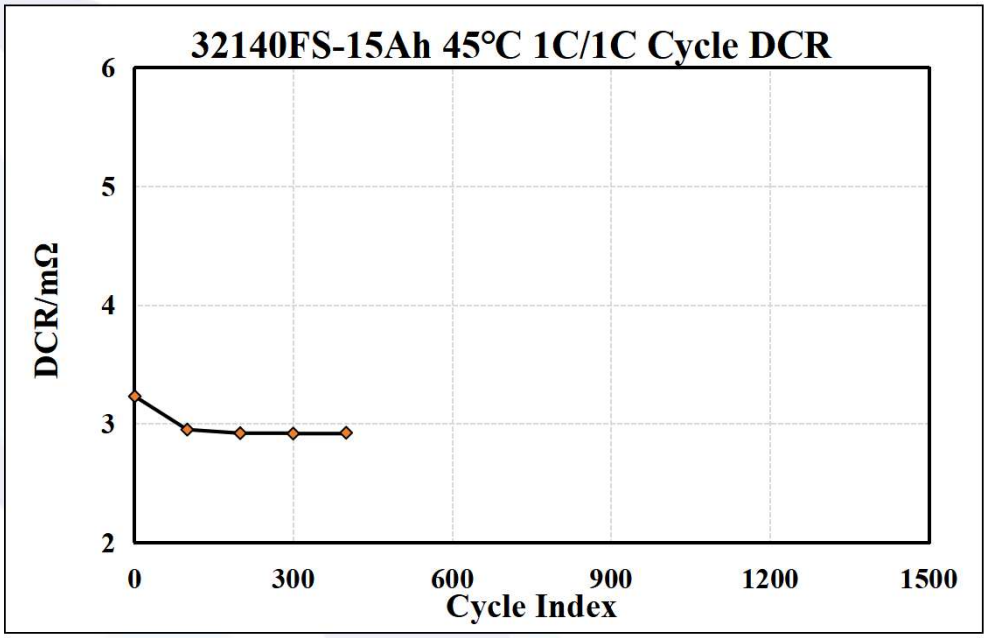
① 1C CCCV charge to 3.6V, 0.05C cut-off, rest for 30min;

② 1C discharge to 2.5V, rest for 30min;

③ Test 50%SOC DCR every hundred Cycles (2C 10s)

Test condition: 45±3℃





The capacity reducing trend @45℃ is stable, 1C/1C cycling life ≈ **1000 cycles** (80%SOH).

2.8 32140FS High Temperature Cycle

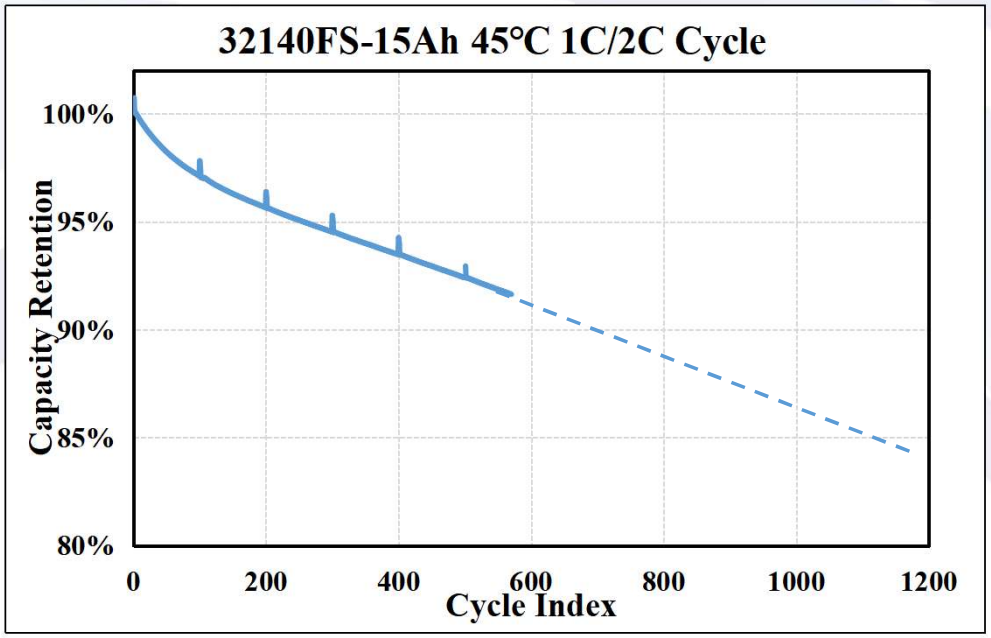
Testing method:

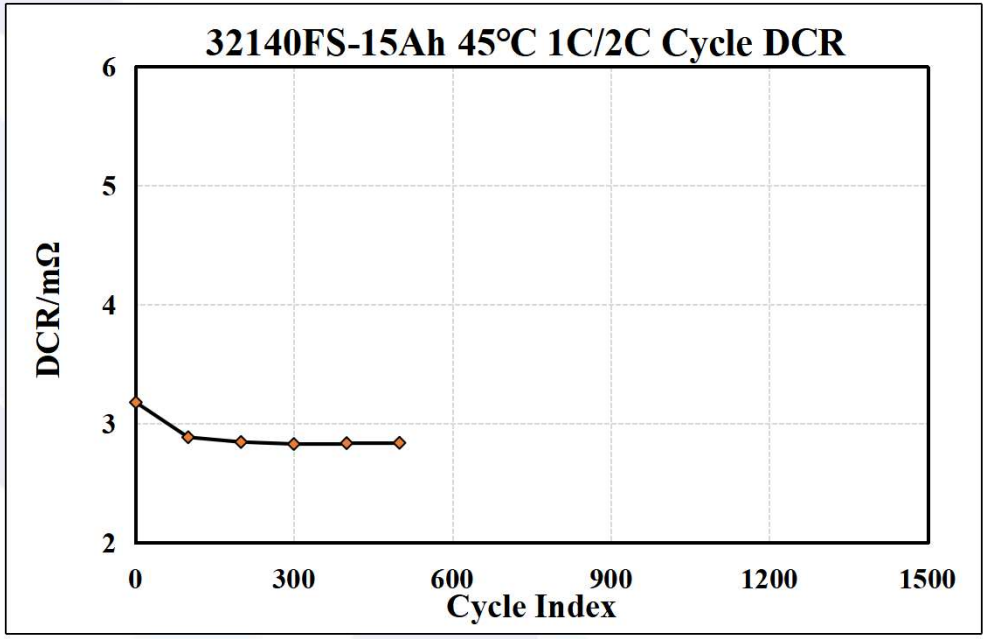
① 1C CCCV charge to 3.6V, 0.05C cut-off, rest for 30min;

② 2C discharge to 2.5V, rest for 1h;

③ Test 50%SOC DCR every hundred Cycles (2C 10s)

Test condition: 45±3℃





The capacity reducing trend @45℃ is stable, 1C/2C cycling life ≈ **1000 cycles** (80%SOH).

3. 32140FS 3.0 Safety Performance

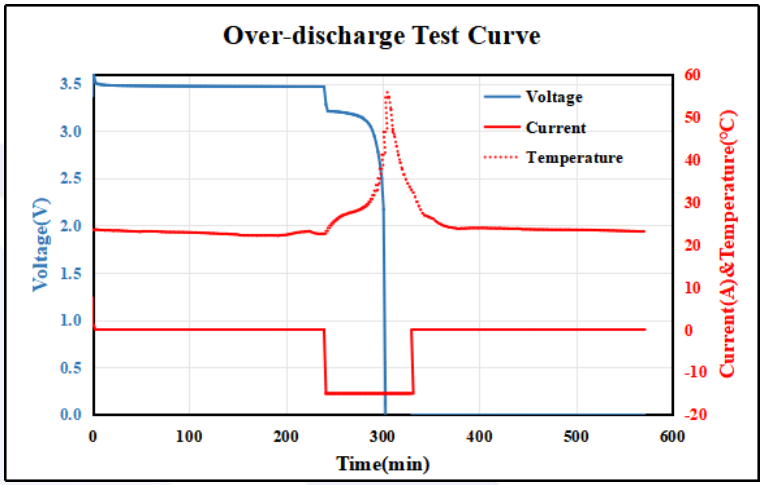
Test items	Pass criteria	Assessment	Test standard
3.1 Over-discharge Test	No fire, no explosion	Passed	GB 38031 8.1.2
3.2 Overcharge Test	No fire, no explosion	Passed	/
3.3 Short-circuit Test	No fire, no explosion	Passed	GB 38031 8.1.4
3.4 Heating Test	No fire, no explosion	Passed	GB 38031 8.1.5
3.5 Crush Test	No fire, no explosion	Passed	UL 1642 13
3.6 Impact Test	No fire, no explosion	Passed	UL 1642 14
3.7 Temperature Test	No fire, no explosion	Passed	GB 38031 8.1.6
3.8 Drop Test	No fire, no explosion	Passed	GB 31241 7.5
3.9 Vibration Test	No leakage, no fire, no explosion	Passed	UL 1642 16
3.10 Low-pressure Test	No leakage, no fire, no explosion	Passed	UL 1642 19

3. 32140FS Safety Performance

3.1 Over-discharge Test

Test: The cell is discharged at a constant current of 1C until the discharge time reaches 90min or the Voltage to 0V, then observed the cell for 1h.

After Testing



No.	Before the test			After the test			Test phenomenon	Result
	OCV (V)	ACIR (mΩ)	weight (g)	OCV (V)	ACIR (mΩ)	weight (g)		
1#	3.345	1.3	290.5	/	1.31	290.5	No fire, no explosion	Passed
2#	3.342	1.2	291.8	/	1.34	291.8	No fire, no explosion	Passed
3#	3.336	1.3	290.6	/	1.36	290.6	No fire, no explosion	Passed

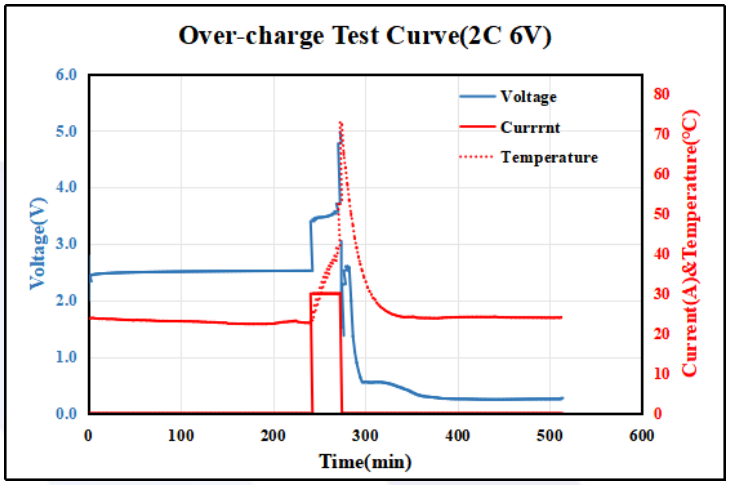
☐ Test result: **No fire, no explosion**;

3. 32140FS Safety Performance

3.2 Overcharge Test

Test: The cell is charged at a constant current of 2C until the Voltage to 6V, observed the cell for 1h.

After Testing



No.	Before the test			After the test			Test phenomenon	Result
	OCV (V)	ACIR (mΩ)	weight (g)	OCV (V)	ACIR (mΩ)	weight (g)		
1#	2.805	1.2	289.7	0.1	/	282.5	No fire, no explosion	Passed
2#	2.811	1.3	291.0	0.1	/	283.9	No fire, no explosion	Passed
3#	2.820	1.3	291.0	0.2	/	286.6	No fire, no explosion	Passed

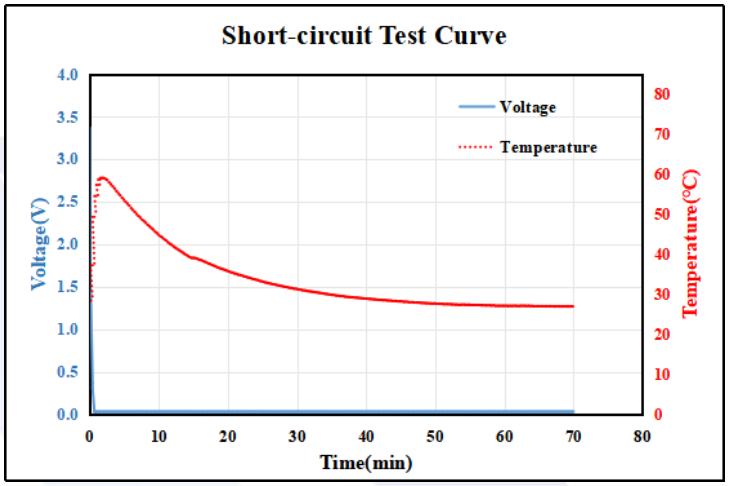
☐ Test result: **No fire, no explosion**;

3. 32140FS Safety Performance

3.3 Short-circuit Test

Test: Short circuit the positive terminal and negative terminal of the cell externally for 10min (external line resistance <5mΩ), then observe for 1h.

After Testing



No.	Before the test			After the test			Test phenomenon	Result
	OCV (V)	ACIR (mΩ)	weight (g)	OCV (V)	ACIR (mΩ)	weight (g)		
1#	3.337	1.3	290.7	/	6.5	290.7	No fire, no explosion	Passed
2#	3.336	1.3	290.6	/	4.1	290.5	No fire, no explosion	Passed
3#	3.338	1.3	289.9	0.128	/	285.2	No fire, no explosion	Passed

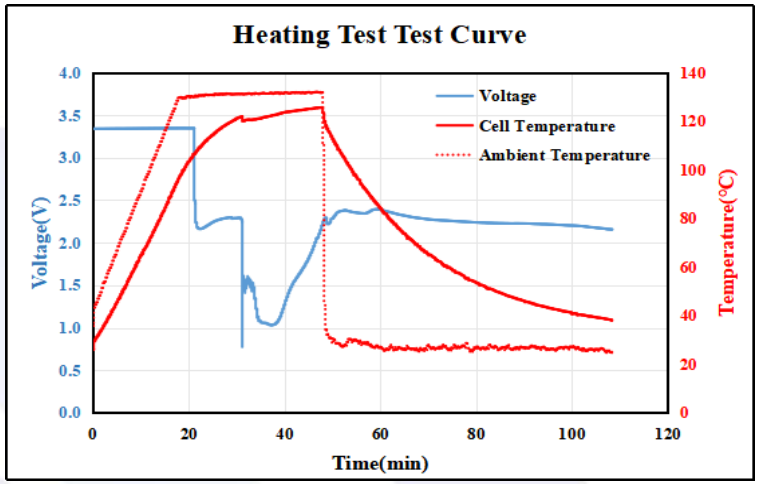
☐ Test result: **No fire, no explosion**;

3. 32140FS Safety Performance

3.4 Heating Test

Test: The cell is heated in a circulating air oven. The temperature of the oven is raised at a rate of 5℃±2℃ per minute to a temperature of 130℃±2℃ and remain for 30min at that temperature before the test is discontinued, then observed the cell for 1h.

After Testing



No.	Before the test			After the test			Test phenomenon	Result
	OCV (V)	ACIR (mΩ)	weight (g)	OCV (V)	ACIR (mΩ)	weight (g)		
1#	3.342	1.3	292.3	0.140	/	274.0	No fire, no explosion	Passed
2#	3.339	1.3	291.4	0.252	/	274.9	No fire, no explosion	Passed
3#	3.344	1.3	292.2	0.313	/	273.9	No fire, no explosion	Passed

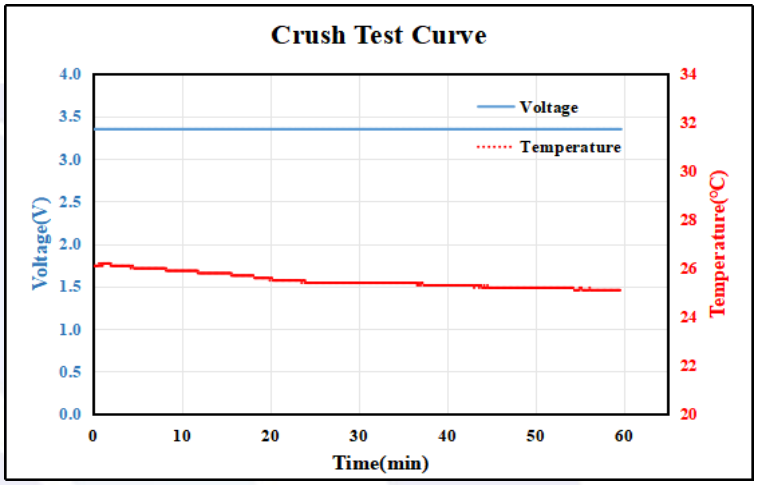
☐ Test result: **No fire, no explosion**;

3. 32140FS Safety Performance

3.5 Crush Test

Test: A cell is to be crushed between two flat surfaces. The force for the crushing is to be applied by a hydraulic ram or similar force mechanism. The flat surfaces are to be brought in contact with the cells and the crushing is to be continued until an applied force of 13 ±1 kN (3000 ±224 lbs) is reached. Once the maximum force has been obtained it is to be released and observe for 1 hour.

After Testing



No.	Before the test			After the test			Test phenomenon	Result
	OCV (V)	ACIR (mΩ)	weight (g)	OCV (V)	ACIR (mΩ)	weight (g)		
1#	3.344	1.4	293.9	3.344	1.4	292.1	No fire, no explosion	Passed
2#	3.339	1.3	291.6	3.338	1.2	289.9	No fire, no explosion	Passed
3#	3.337	1.3	291.7	3.337	1.3	290.4	No fire, no explosion	Passed

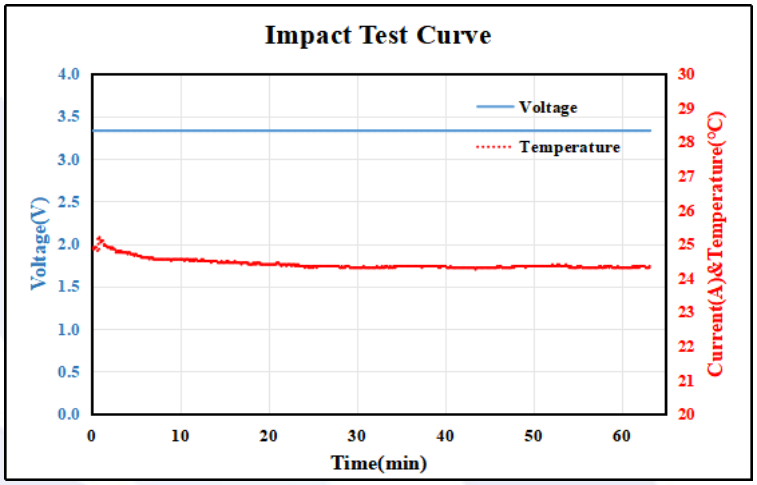
☐ Test result: **No fire, no explosion**;

3. 32140FS Safety Performance

3.6 Impact Test

Test: The cell is to be placed on the impact flat. A Φ15.8mm bar is to be placed on the center of the cell. A 9.1kg weight is to be dropped from a height of 610mm onto the cell, the distortion is allowed.

After Testing



No.	Before the test			After the test			Test phenomenon	Result
	OCV (V)	ACIR (mΩ)	weight (g)	OCV (V)	ACIR (mΩ)	weight (g)		
1#	3.339	1.4	292.0	3.336	1.2	292.0	No fire, no explosion	Passed
2#	3.348	1.3	293.1	3.345	1.4	293.1	No fire, no explosion	Passed
3#	3.341	1.3	292.0	3.339	1.2	292.0	No fire, no explosion	Passed

☐ Test result: **No fire, no explosion**;

3. 32140FS Safety Performance

3.7 Temperature Test

Test: The cell is charged in accordance with Standard Charge, heated the cell in an oven. In 60min, the temperature of the oven is dropped to the temperature of -40℃ and remain for 90min at -40℃; In 60min, the temperature of the oven is raised to the temperature of 25℃; In 90min, the temperature of the oven is raised to the temperature of 85℃ and remain for 110min at 85℃; In 70min, the temperature of the oven is dropped to the temperature of 25℃; Repeat this for 5 cycles, after that observed the cell for 1h.

No.	Before the test			After the test			Test phenomenon	Result
	OCV (V)	ACIR (mΩ)	weight (g)	OCV (V)	ACIR (mΩ)	weight (g)		
1#	3.333	1.2	290.7	3.329	1.3	290.7	No fire, no explosion	Passed
2#	3.334	1.2	289.8	3.330	1.2	289.8	No fire, no explosion	Passed
3#	3.342	1.2	291.2	3.331	1.3	291.2	No fire, no explosion	Passed

- Test result: **No fire, no explosion**;

3. 32140FS Safety Performance

3.8 Drop Test

Test: The cell is charged in accordance with Standard Charge, then dropped the cell from a height of 1m to the concrete ground , once on positive and negative terminals and twice on the cylinder downward.

No.	Before the test			After the test(After 24 h)			Test phenomenon	Result
	OCV (V)	ACIR (mΩ)	weight (g)	OCV (V)	ACIR (mΩ)	weight (g)		
1#	3.332	1.2	290.1	3.334	1.6	3.332	No fire, no explosion	Passed
2#	3.333	1.2	291.5	3.333	1.4	3.333	No fire, no explosion	Passed
3#	3.333	1.2	291.9	3.333	1.6	3.333	No fire, no explosion	Passed

- Test result: **No fire, no explosion**;

3. 32140FS Safety Performance

3.9 Vibration Test

Test: The cell is charged in accordance with Standard Charge, then installed onto the vibration desk with clamps. Equipment parameters of frequency and amplitude are as follows (the frequency is varied at the rate of 1Hz/min between 10 and 55 hertz, and repeat vibration for 90-100min, amplitude: 0.8mm. The cell is tested in three mutually perpendicular directions).

No.	Before the test			After the test(After 24 h)			Test phenomenon	Result
	OCV (V)	ACIR (mΩ)	weight (g)	OCV (V)	ACIR (mΩ)	weight (g)		
1#	3.341	1.3	290.7	3.339	1.4	290.7	No leakage, no fire, no explosion	Passed
2#	3.334	1.3	290.2	3.334	1.3	290.1	No leakage, no fire, no explosion	Passed
3#	3.338	1.2	291.0	3.336	1.3	291.0	No leakage, no fire, no explosion	Passed

- Test result: **No leakage, no fire, no explosion**;

3. 32140FS Safety Performance

3.10 Low-pressure Test

Test: The cell is charged in accordance with Standard Charge, then stored it for 6 hours at an absolute pressure of 11.6kPa, then check cell's appearance.

No.	Before the test			After the test(After 24 h)			Test phenomenon	Result
	OCV (V)	ACIR (mΩ)	weight (g)	OCV (V)	ACIR (mΩ)	weight (g)		
1#	3.341	1.2	290.3	3.338	1.2	290.3	No leakage, no fire, no explosion	Passed
2#	3.339	1.3	290.7	3.338	1.3	290.7	No leakage, no fire, no explosion	Passed
3#	3.343	1.2	291.7	3.340	1.2	291.7	No leakage, no fire, no explosion	Passed

- Test result: **No leakage, no fire, no explosion**;