



Battery Test Report

Battery Test Analysis Report

Report Information	
Test Plans	Cycling_EIS_NCR18650PF
DUTs	Cycling_EIS_NCR18650PF A.5, Cycling_EIS_NCR18650PF A.6, Cycling_EIS_NCR18650PF A.7, Cycling_EIS_NCR18650PF A.8
Chemistry	N/A
Number of Sources	4
Generated	2026-06-23 11:23

Prepared by:	
Reviewed by:	
Approved by:	

Devices Under Test

DUT: Cycling_EIS_NCR18650PF A.5

Parameter	Value	Unit
Start date	Fri Jun 2 14:09:34 2023	
End date	Mon Jun 5 17:18:54 2023	
DUT Type Name	NCR18650PF	
Nominal Capacity	2750.00	mAh
Nominal Voltage	3.60	V
Min Voltage	2.50	V
Max Voltage	4.20	V
Chemistry	N/A	
Producer	N/A	
Supplier	N/A	
Mass	N/A	g

DUT: Cycling_EIS_NCR18650PF A.6

Parameter	Value	Unit
Start date	Fri Jun 2 14:09:34 2023	
End date	Mon Jun 5 17:18:54 2023	
DUT Type Name	NCR18650PF	
Nominal Capacity	2750.00	mAh
Nominal Voltage	3.60	V
Min Voltage	2.50	V
Max Voltage	4.20	V
Chemistry	N/A	
Producer	N/A	
Supplier	N/A	
Mass	N/A	g

DUT: Cycling_EIS_NCR18650PF A.7

Parameter	Value	Unit
Start date	Fri Jun 2 14:09:34 2023	
End date	Mon Jun 5 17:18:54 2023	
DUT Type Name	NCR18650PF	
Nominal Capacity	2750.00	mAh
Nominal Voltage	3.60	V
Min Voltage	2.50	V
Max Voltage	4.20	V
Chemistry	N/A	
Producer	N/A	
Supplier	N/A	
Mass	N/A	g

DUT: Cycling_EIS_NCR18650PF A.8

Parameter	Value	Unit
Start date	Fri Jun 2 14:09:34 2023	
End date	Mon Jun 5 17:18:54 2023	
DUT Type Name	NCR18650PF	
Nominal Capacity	2750.00	mAh
Nominal Voltage	3.60	V
Min Voltage	2.50	V
Max Voltage	4.20	V
Chemistry	N/A	
Producer	N/A	
Supplier	N/A	
Mass	N/A	g

Test Information

Parameter	Value
Test Plan Name	Cycling_EIS_NCR18650PF
Test Plan Creation Date	Fri Jun 2 14:09:11 2023
Test Plan Modification Date	Thu Jun 8 09:45:44 2023

Test Plan ID	test_plan_94
Cycle Mode	DISCHARGE_CHARGE
Hardware Type	BCS_915
Tags	SalesMeeting

Test Summary - Cycling_EIS_NCR18650PF A.5

Metric	Value	Unit
Duration	03::03::09::20	d::hh::mm::ss
Total Cycles Tested	15	cycles
Initial Discharge Capacity	2794	mAh
Final Discharge Capacity	2777	mAh
Capacity Fade	17.2	mAh
Capacity Fade	0.62	%
Fade Rate	0.0411	%/cycle
Average Coulombic Efficiency	nan	%
Efficiency Std Dev	nan	%
Initial Discharge Energy	10.05	Wh
Final Discharge Energy	9.99	Wh
Average Discharge Energy	10.03	Wh
Initial Cycle Duration	5.15	h
Final Cycle Duration	2.19	h
Average Cycle Duration	4.94	h
Average Cell Voltage	3.80	V

Test Summary - Cycling_EIS_NCR18650PF A.6

Metric	Value	Unit
Duration	03::03::09::20	d::hh::mm::ss
Total Cycles Tested	15	cycles
Initial Discharge Capacity	2797	mAh
Final Discharge Capacity	2777	mAh
Capacity Fade	20.0	mAh

Capacity Fade	0.71	%
Fade Rate	0.0476	%/cycle
Average Coulombic Efficiency	nan	%
Efficiency Std Dev	nan	%
Initial Discharge Energy	10.07	Wh
Final Discharge Energy	9.99	Wh
Average Discharge Energy	10.03	Wh
Initial Cycle Duration	5.17	h
Final Cycle Duration	2.18	h
Average Cycle Duration	4.95	h
Average Cell Voltage	3.80	V

Test Summary - Cycling_EIS_NCR18650PF A.7

Metric	Value	Unit
Duration	03::03::09::20	d::hh::mm::ss
Total Cycles Tested	15	cycles
Initial Discharge Capacity	2795	mAh
Final Discharge Capacity	2776	mAh
Capacity Fade	19.3	mAh
Capacity Fade	0.69	%
Fade Rate	0.0461	%/cycle
Average Coulombic Efficiency	nan	%
Efficiency Std Dev	nan	%
Initial Discharge Energy	10.06	Wh
Final Discharge Energy	9.99	Wh
Average Discharge Energy	10.03	Wh
Initial Cycle Duration	5.17	h
Final Cycle Duration	2.19	h
Average Cycle Duration	4.94	h
Average Cell Voltage	3.80	V

Test Summary - Cycling_EIS_NCR18650PF A.8

Metric	Value	Unit
Duration	03::03::09::20	d::hh::mm::ss
Total Cycles Tested	15	cycles
Initial Discharge Capacity	2834	mAh
Final Discharge Capacity	2810	mAh
Capacity Fade	24.3	mAh
Capacity Fade	0.86	%
Fade Rate	0.0571	%/cycle
Average Coulombic Efficiency	nan	%
Efficiency Std Dev	nan	%
Initial Discharge Energy	10.19	Wh
Final Discharge Energy	10.11	Wh
Average Discharge Energy	10.15	Wh
Initial Cycle Duration	5.10	h
Final Cycle Duration	2.21	h
Average Cycle Duration	4.92	h
Average Cell Voltage	3.80	V

Graphical Analysis

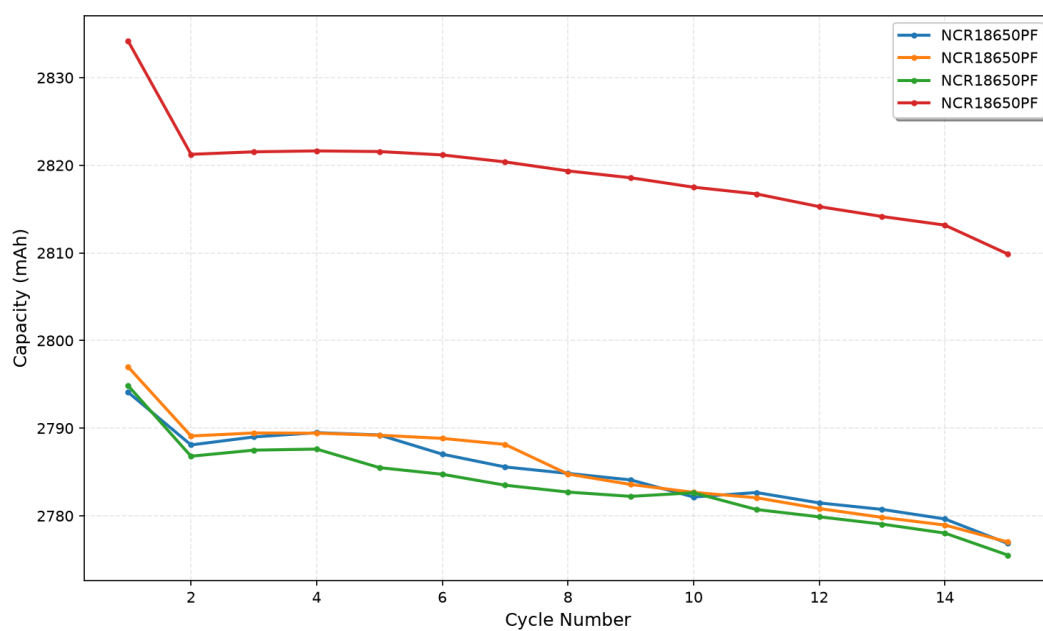


Figure 1: Discharge capacity evolution for all DUTs

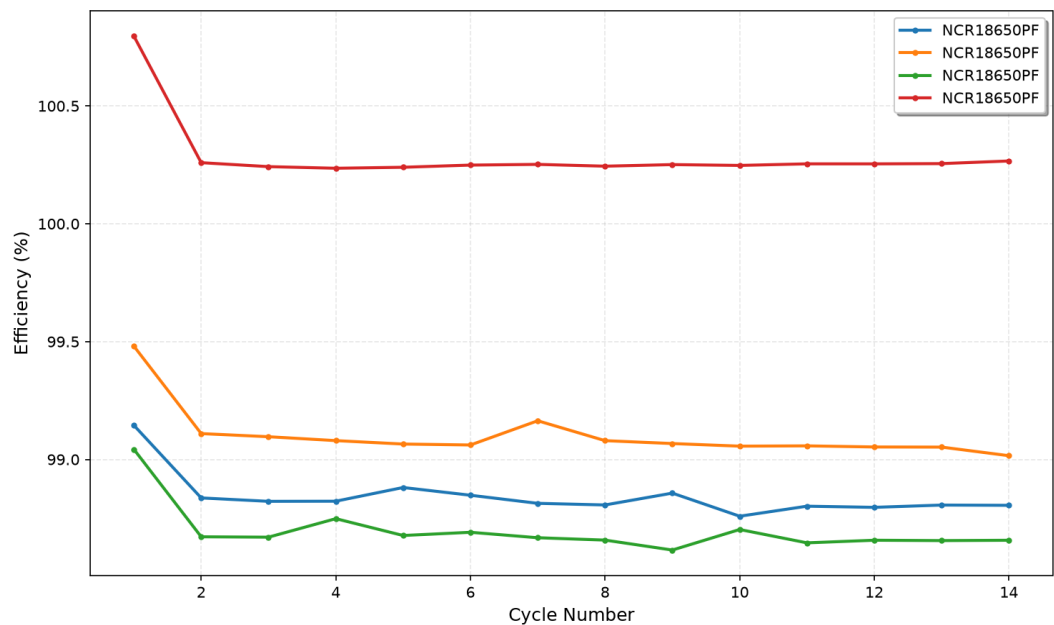


Figure 2: Coulombic efficiency for all DUTs

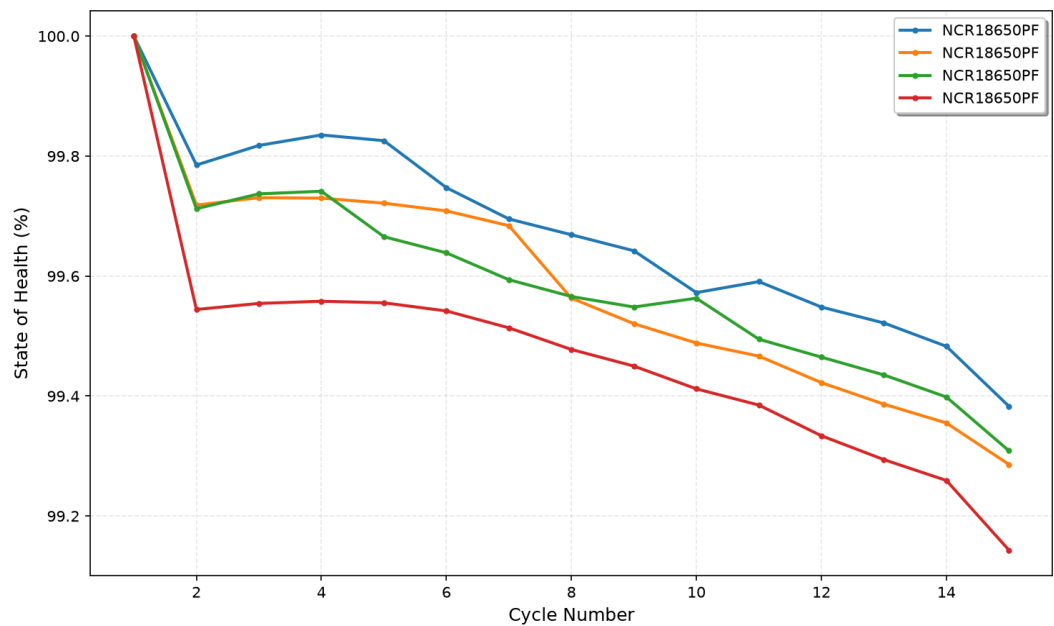


Figure 3: Capacity retention (State of Health) for all DUTs

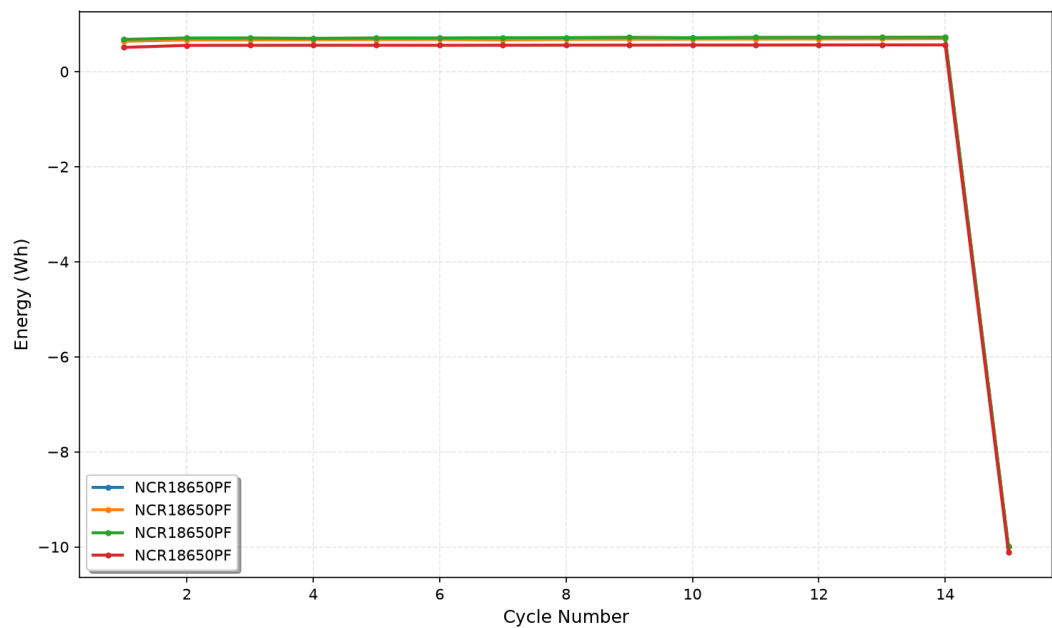


Figure 4: Energy evolution for all DUTs

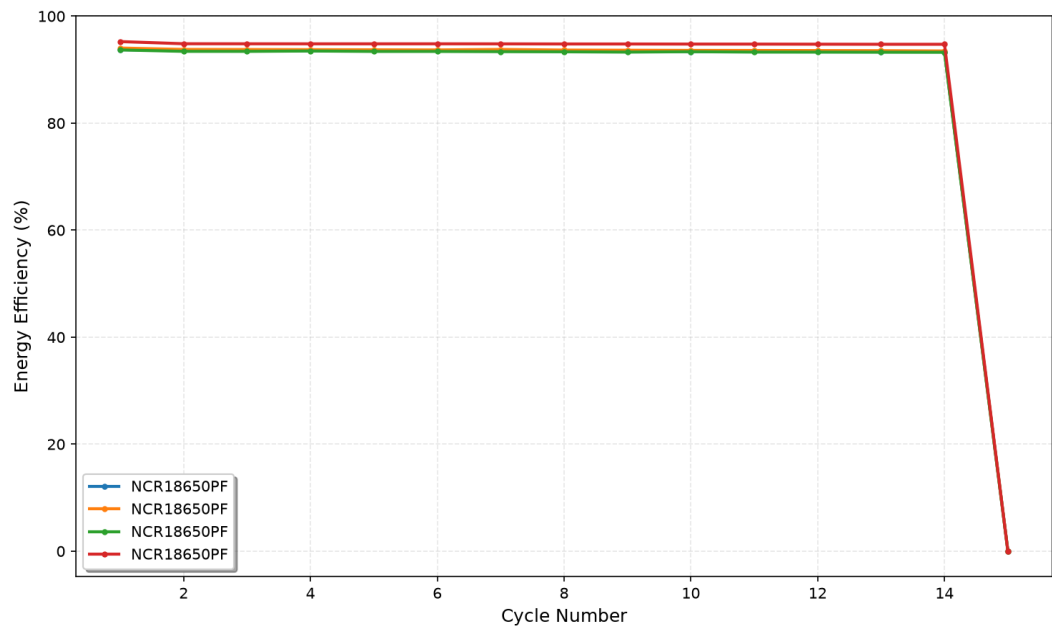


Figure 5: Energy efficiency for all DUTs

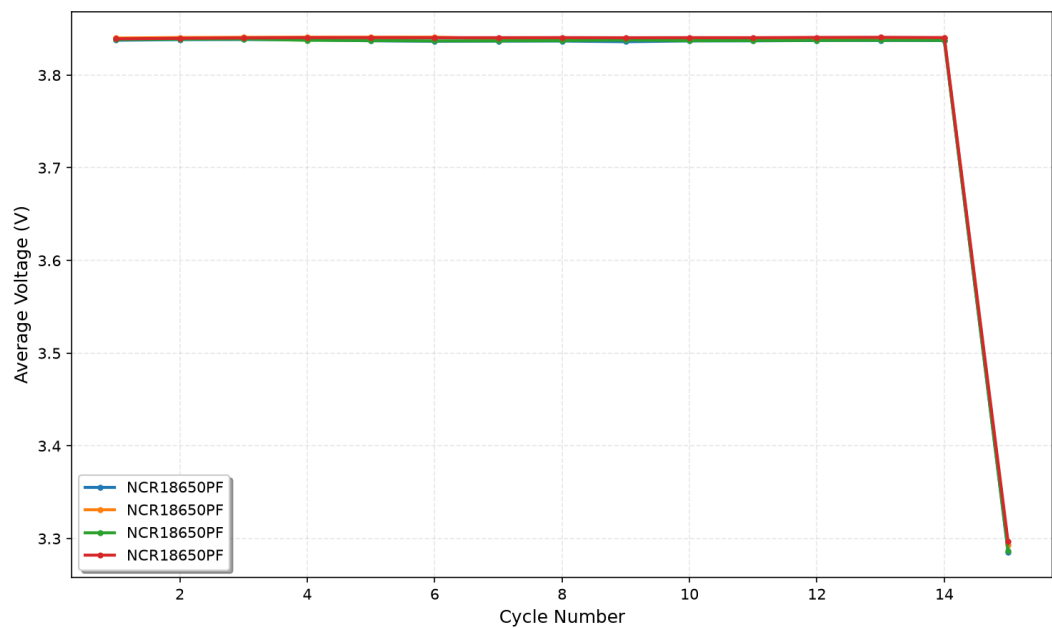


Figure 6: Average voltage evolution for all DUTs

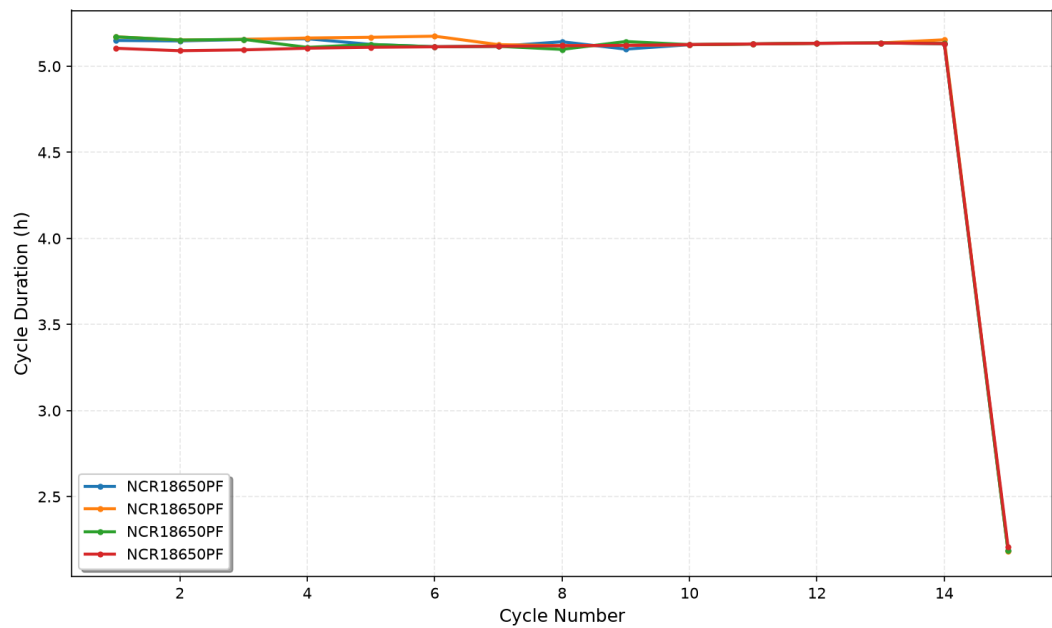


Figure 7: Cycle duration evolution for all DUTs

Detailed Data

Cycle	Q Charge (mAh)	Q Discharge (mAh)	Efficiency (%)	Energy Dch (Wh)	Duration (h)	Umean (V)
1	2818	2794	99.1	10.05	5.15	3.838

2	2821	2788	98.8	10.04	5.15	3.838
3	2822	2789	98.8	10.05	5.16	3.838
4	2823	2789	98.8	10.05	5.16	3.838
5	2821	2789	98.9	10.05	5.13	3.837
6	2820	2787	98.8	10.04	5.11	3.837
7	2819	2786	98.8	10.03	5.12	3.837
8	2818	2785	98.8	10.03	5.14	3.837
9	2816	2784	98.9	10.02	5.10	3.836
10	2817	2782	98.8	10.02	5.13	3.837
11	2816	2783	98.8	10.02	5.13	3.837
12	2815	2781	98.8	10.01	5.13	3.837
13	2814	2781	98.8	10.01	5.14	3.837
14	2813	2780	98.8	10.00	5.13	3.837
15	0	2777	N/A	9.99	2.19	3.286

Table 1: Per-Cycle Data - NCR18650PF

Cycle	Q Charge (mAh)	Q Discharge (mAh)	Efficiency (%)	Energy Dch (Wh)	Duration (h)	Umean (V)
1	2812	2797	99.5	10.07	5.17	3.840
2	2814	2789	99.1	10.05	5.15	3.841
3	2815	2789	99.1	10.05	5.16	3.841
4	2815	2789	99.1	10.05	5.16	3.841
5	2816	2789	99.1	10.04	5.17	3.841
6	2815	2789	99.1	10.04	5.17	3.841
7	2812	2788	99.2	10.04	5.13	3.839
8	2811	2785	99.1	10.02	5.12	3.839
9	2810	2784	99.1	10.02	5.12	3.839
10	2809	2783	99.1	10.01	5.13	3.839
11	2809	2782	99.1	10.01	5.13	3.839
12	2807	2781	99.1	10.00	5.13	3.839
13	2806	2780	99.1	10.00	5.14	3.840
14	2807	2779	99.0	9.99	5.15	3.840
15	0	2777	N/A	9.99	2.18	3.293

Table 2: Per-Cycle Data - NCR18650PF

Cycle	Q Charge (mAh)	Q Discharge (mAh)	Efficiency (%)	Energy Dch (Wh)	Duration (h)	Umean (V)
1	2822	2795	99.0	10.06	5.17	3.838

2	2824	2787	98.7	10.04	5.15	3.839
3	2825	2787	98.7	10.05	5.16	3.839
4	2823	2788	98.7	10.05	5.11	3.838
5	2823	2785	98.7	10.04	5.13	3.837
6	2822	2785	98.7	10.03	5.11	3.837
7	2821	2783	98.7	10.03	5.12	3.837
8	2821	2783	98.7	10.02	5.10	3.837
9	2821	2782	98.6	10.02	5.14	3.838
10	2819	2783	98.7	10.02	5.13	3.837
11	2819	2781	98.6	10.01	5.13	3.837
12	2818	2780	98.7	10.01	5.13	3.838
13	2817	2779	98.7	10.00	5.14	3.838
14	2816	2778	98.7	10.00	5.13	3.838
15	0	2776	N/A	9.99	2.19	3.287

Table 3: Per-Cycle Data - NCR18650PF

Cycle	Q Charge (mAh)	Q Discharge (mAh)	Efficiency (%)	Energy Dch (Wh)	Duration (h)	Umean (V)
1	2812	2834	100.8	10.19	5.10	3.839
2	2814	2821	100.3	10.16	5.09	3.840
3	2815	2822	100.2	10.16	5.10	3.840
4	2815	2822	100.2	10.16	5.10	3.840
5	2815	2822	100.2	10.16	5.11	3.840
6	2814	2821	100.2	10.16	5.11	3.840
7	2813	2820	100.3	10.15	5.12	3.840
8	2812	2819	100.2	10.15	5.12	3.840
9	2812	2819	100.3	10.14	5.12	3.840
10	2811	2817	100.2	10.14	5.13	3.840
11	2810	2817	100.3	10.14	5.13	3.840
12	2808	2815	100.3	10.13	5.13	3.841
13	2807	2814	100.3	10.12	5.14	3.841
14	2806	2813	100.3	10.12	5.13	3.841
15	0	2810	N/A	10.11	2.21	3.297

Table 4: Per-Cycle Data - NCR18650PF

Conclusions and Recommendations

This comprehensive battery analysis report presents the test results for 15 charge-discharge cycles. The key findings are:

Performance Summary:

The battery demonstrates excellent performance with a capacity retention of 99.7% after 15 cycles. The initial discharge capacity of 2789 mAh decreased to 2780 mAh, representing a total fade of 9.4 mAh (0.34%).

Warning - Anomalous Cycles Detected:

The following cycles show a capacity deviating more than 10% from the dataset median and may correspond to incomplete, interrupted, or formation cycles:

- Cycle 15 (end): voltage deviation 14.4% (3.286 V vs median 3.837 V)

These cycles are excluded from the reference capacity calculation but may affect trend analysis.

Degradation Rate:

The average capacity fade rate is 0.0353% per cycle, suggesting a linear degradation pattern. This indicates stable aging behavior without sudden failures.

Efficiency:

The coulombic efficiency remains acceptable at 98.843% +/- 0.0884%, indicating good charge-discharge reversibility.

Recommendations:

Based on these results, the battery is suitable for applications requiring long-term cycling stability. The predictable degradation pattern allows for accurate end-of-life estimation.

Key Performance Indicators:

- Capacity retention: **99.7%**
- Total cycles: **15**
- Fade rate: **0.0353% per cycle**
- Coulombic efficiency: **98.843%**
- Anomalous cycles detected: **1**
- Performance rating: **EXCELLENT**