



新普科技股份有限公司
 新世電子(常熟)有限公司
 新普科技(重慶)有限公司
 華普電子(常熟)有限公司

Control Number: SLEU-1905006

Lithium-ion Battery UN38.3 Test Report

Recommendations on the TRANSPORT OF DANGEROUS GOODS

(Manual of Tests and Criteria, Sixth revised edition, Amend 1)

Customer: Lenovo

Model: L18M4PH0

Rating/ Mass: 7.68V, Typical Capacity 7820mAh/ 60Wh

Rated Capacity 7630mAh/ 58Wh/ 243 (g)

Issue date: 2019/05/15

Approved By	Checked By	Prepared By
Assistant Manager	Authorized Signatory	Test Engineer
<i>Sung Sin</i>	<i>[Signature]</i>	<i>Mia Deng</i>

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Email : Test_Lab@simplo.com.tw

Website : <http://www.simplo.com.tw/>



Form No. : W11-002-B05

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1. Purpose of the Test :

To test each cell/battery is of the type proved to meet the requirements in United Nations Recommendations on the TRANSPORT OF DANGEROUS GOODS, Manual of Tests and Criteria, Sixth revised edition, Amend 1, Section 38.3.

2. Test Result :

Test results of the UN Recommendations on the Transport of Dangerous Goods

No.	Test Item	Test results
T.1	Altitude simulation	PASS
T.2	Thermal test	PASS
T.3	Vibration test	PASS
T.4	Shock test	PASS
T.5	External short circuit	PASS
T.6	Impact, Crush test	PASS
T.7	Overcharge	PASS
T.8	Forced discharge	PASS

3. Test Lab: Email : Test_Lab@simplo.com.tw Website : <http://www.simplo.com.tw/>

●	SIMPLO (Taiwan) Laboratory ADD : No. 471 Pa Teh Rd, Sec 2 Hu Kou, Hsinchu Hsien, 303 Taiwan TEL: +886-3-5695920 FAX: +886-3-5695931
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4. Product manufacturer : Email : Test_Lab@simplo.com.tw Website : <http://www.simplo.com.tw/>

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5. Test Quantity :

- 5.1 Four batteries, at first cycle, in fully charged states. (For T.1~T.5)
- 5.2 Four batteries, after 25 cycles ending in fully charged states. (For T.1~T.5)
- 5.3 Five component cells, at first cycle at 50% of the design rated capacity. (For T.6)
- 5.4 Five component cells, after 25 cycles at 50% of the design rated capacity. (For T.6)
- 5.5 Four batteries, at first cycle, in fully charged states. (For T.7)
- 5.6 Four batteries, after 25 cycles ending in fully charged states. (For T.7)
- 5.7 Ten component cells, at first cycle in fully discharge states. (For T.8)
- 5.8 Ten component cells, after 25 cycles ending in fully discharged states. (For T.8)

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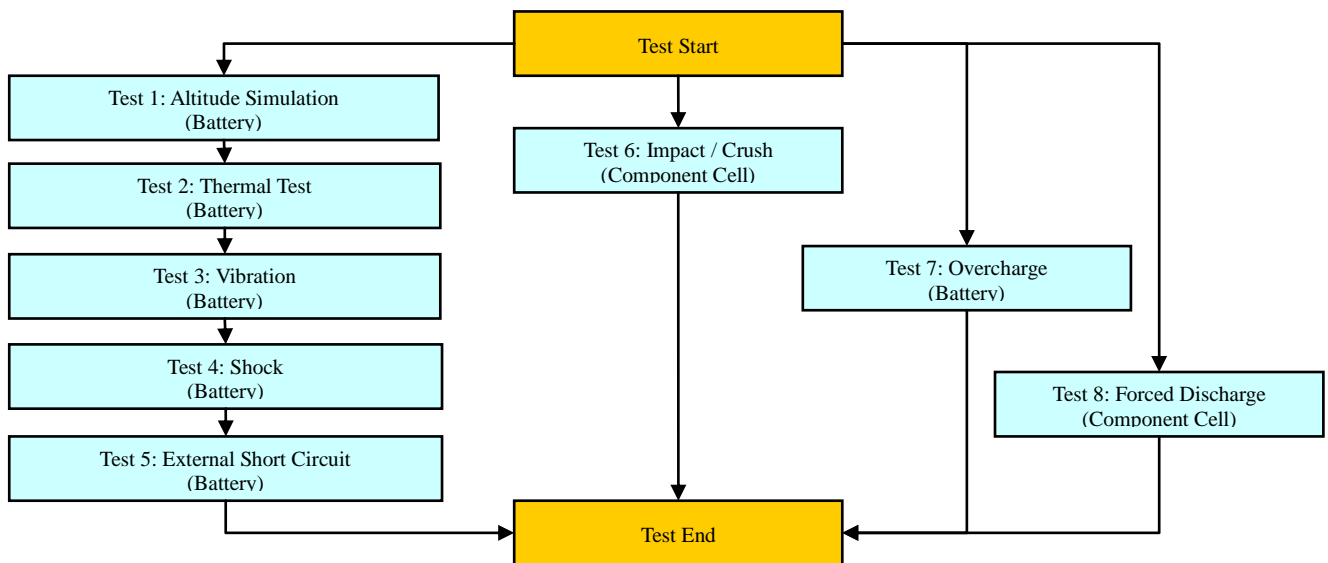
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6. Test Procedure :

6.1 All detailed test procedures must be based on United Nations Recommendations on the TRANSPORT OF DANGEROUS GOODS, Manual of Tests and Criteria, Sixth revised edition, Amend 1, Section 38.3.

6.2 Test flow shall be followed as below.



Conclusion: The samples had passed the test items of UN38.3.

7. Comment :

Follow the requirement of “TRANSPORT OF DANGEROUS GOODS, Manual of Tests and Criteria, Sixth revised edition, Amend 1, Section 38.3”, this report was updated. (The control number of old report: SLEU-1812001)



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8. Test Equipment :

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Revised Date: 2018-12-04

Test Instruments Reference List								
Used	Instrument ID	Instrument Name	Type	Range of use	Manufacturer	Calibration Date_Last	Calibration Date_Next	Remarks
Pretest								
V	ML-761	Learning	715C	0~18V 0~8A	SMP	2018/2/26	2019/2/26	
V	ML-762	Learning	715C	0~18V 0~8A	SMP	2018/1/3	2019/1/3	
V	ML-763	Learning	715C	0~18V 0~8A	SMP	2018/2/26	2019/2/26	
V	ML-764	Learning	715C	0~18V 0~8A	SMP	2018/1/3	2019/1/3	
	ML-925	Learning	750C8	0~60V 0~30A	SMP	2018/1/3	2019/1/3	
T.1 Altitude Simulation								
V	ML-522	Altitude	SVT-120	Kpa:30~90	HSIN JIANG	2018/7/18	2019/7/18	
V	ML-257	Multimeter	HP 34401A	Note 1	Agilent	2018/3/1	2019/3/1	
V	ML-494	Electronic Balance	XS1220M-SCS	1-1220 gf	CHUANHUA	2018/7/18	2019/7/18	
	ML-523	Electronic Balance	MTW-30K	30*0.005Kg		2018/9/12	2019/9/12	
V	ML-550	Data Logger	313	15~35 ℃; 30~80 %RH	CENTER	2018/9/18	2019/9/18	
T.2 Thermal Test								
V	ML-789	Thermal Shock	GTST-080-65-AW	T:40 to 120℃	GF	2018/1/3	2019/1/3	
V	ML-257	Multimeter	HP 34401A	note 1	Agilent	2018/3/1	2019/3/1	
	ML-494	Electronic Balance	XS1220M-SCS	1-1220 gf	CHUANHUA	2018/7/18	2019/7/18	
	ML-523	Electronic Balance	MTW-30K	30*0.005Kg		2018/9/12	2019/9/12	
V	ML-551	Data Logger	313	15~35 ℃; 30~80 %RH	CENTER	2018/9/18	2019/9/18	
T.3 Vibration								
V	ML-233	Vibration	KD-9636-EM-300F2K-30N80	F:5~2000Hz G:0.2~20G	King Design	2018/8/24	2019/8/24	
V	ML-257	Multimeter	HP 34401A	note 1	Agilent	2018/3/1	2019/3/1	
	ML-494	Electronic Balance	XS1220M-SCS	1-1220 gf	CHUANHUA	2018/7/18	2019/7/18	
	ML-523	Electronic Balance	MTW-30K	30*0.005Kg		2018/9/12	2019/9/12	
V	ML-552	Data Logger	313	15~35 ℃; 30~80 %RH	CENTER	2018/9/18	2019/9/18	
T.4 Shock								
V	ML-056	Shock	DP-1200-25	G:10~600G	King Design	2018/8/24	2019/8/24	
V	ML-257	Multimeter	HP 34401A	note 1	Agilent	2018/3/1	2019/3/1	
	ML-494	Electronic Balance	XS1220M-SCS	1-1220 gf	CHUANHUA	2018/7/18	2019/7/18	
	ML-523	Electronic Balance	MTW-30K	30*0.005Kg		2018/9/12	2019/9/12	
V	ML-551	Data Logger	313	15~35 ℃; 30~80 %RH	CENTER	2018/9/18	2019/9/18	
T.5 External Short Circuit								
V	ML-534	mΩ Hitester	3540	1mΩ ~ 30kΩ	HIOKI	2018/9/18	2019/9/18	
V	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 150℃	Yokogawa	2018/9/12	2019/9/12	
V	ML-460	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 150℃	Yokogawa	2018/9/12	2019/9/12	
V	ML-521	Oven	9031	30~80 ℃	YEOW LONG	2018/9/12	2019/9/12	
V	ML-549	Data Logger	313	15~35 ℃; 30~80 %RH	CENTER	2018/9/18	2019/9/18	
T.6 Impact / Crush								
V	ML-339	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 150℃	Yokogawa	2018/5/17	2019/5/17	
	ML-076	Impact Tester			JYI SHENG	2018/1/3	2019/1/3	
	ML-553	Crush Tester	BCT-01		Simplo	2018/5/16	2019/5/16	
V	ML-866	Crush Tester	M0654		JYI SHENG	2018/4/9	2019/4/9	
	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 150℃	Yokogawa	2018/9/12	2019/9/12	

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Revised Date: 2018-12-04

Test Instruments Reference List								
Used	Instrument ID	Instrument Name	Type	Range of use	Manufacturer	Calibration Date_Last	Calibration Date_Next	Remarks
T.7 Overcharge								
	ML-482	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2018/5/17	2019/5/17	
	ML-483	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2018/5/17	2019/5/17	
	ML-484	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2018/5/17	2019/5/17	
	ML-486	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2018/5/17	2019/5/17	
	ML-487	Programmable DC Source	DS6024	1-60 Vdc, 0.3-24A	MOTECH	2018/5/17	2019/5/17	
V	ML-549	Data Logger	313	15-35 °C; 30-80 %RH	CENTER	2018/9/18	2019/9/18	
	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 150°C	Yokogawa	2018/9/12	2019/9/12	
	ML-460	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 150°C	Yokogawa	2018/9/12	2019/9/12	
V	ML-918	Overcharge & Forced discharge tester	T901	3-30 Vdc, Charge: 0.05-20A Discharge: 0.02-10A	SMP	2018/5/17	2019/5/17	
T.8 Forced Discharge								
	ML-132	Electronic Load	3311C	60V,55A, 300W	Prodigit	2018/3/1	2019/3/1	
	ML-133	Electronic Load	3311C	60V,55A, 300W	Prodigit	2018/3/1	2019/3/1	
	ML-136	Electronic Load	3311C	60V,55A, 300W	Prodigit	2018/3/1	2019/3/1	
	ML-192	Electronic Load	3311C	60V,55A, 300W	Prodigit	2018/3/1	2019/3/1	
	ML-269	Electronic Load	3311C	60V,55A, 300W	Prodigit	2018/3/1	2019/3/1	
	ML-532	DC Electronic Load	33511-01	120V, 240A, 3600W	Prodigit	2018/7/18	2019/7/18	
	ML-482	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2018/5/17	2019/5/17	
	ML-483	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2018/5/17	2019/5/17	
	ML-484	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2018/5/17	2019/5/17	
	ML-486	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2018/5/17	2019/5/17	
	ML-487	Programmable DC Source	DS6024	1-60 Vdc, 0.3-24A	MOTECH	2018/5/17	2019/5/17	
V	ML-549	Data Logger	313	15-35 °C; 30-80 %RH	CENTER	2018/9/18	2019/9/18	
	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 150°C	Yokogawa	2018/9/12	2019/9/12	
	ML-460	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 150°C	Yokogawa	2018/9/12	2019/9/12	
V	ML-918	Overcharge & Forced discharge tester	T901	3-30 Vdc, Charge: 0.05-20A Discharge: 0.02-10A	SMP	2018/5/17	2019/5/17	
Note 1: DC Voltage: 0.1-1000V; AC Voltage: 0.5-700V at 60Hz, 1kHz; Resistance: 10Ω-10MΩ; DC Current: 0.1mA-3A; AC Current: 0.01-3A at 60Hz, 0.01-1A, at 1kHz.								

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Pretest								
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V	ML-762	Learning	715C	0-18V 0-8A	SMP	2019/1/3	2020/1/3	
V	ML-763	Learning	715C	0-18V 0-8A	SMP	2019/2/26	2020/2/26	
V	ML-764	Learning	715C	0-18V 0-8A	SMP	2019/1/3	2020/1/3	
	ML-925	Learning	750C8	0-60V 0-30A	SMP	2019/1/3	2020/1/3	
T.6 Impact / Crush								
V	ML-339	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 150°C	Yokogawa	2019/5/10	2020/5/10	
	ML-076	Impact Tester			JYI SHENG	2019/1/3	2020/1/3	
	ML-553	Crush Tester	BCT-01		Simplo	2019/5/10	2020/5/10	
V	ML-866	Crush Tester	M0654		JYI SHENG	2019/4/8	2020/4/8	
	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200°C	Yokogawa	2018/9/12	2019/9/12	

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Control Number: SLEU-1905006

9. T.1~T.8 Detail Reports:

UN 38.3 Test Datasheet UN38.3/ST/SG/AC.10/11/Rev.6/Amend.1

Control Number: SLEU-1905006	Customer: Lenovo	Model Name: L18M4PH0	SMP Project Name: YogaC940
Pack P/N: 928QA267H (A)(B)	Configuration: 2S2P	Test Duration: 2018/11/05~2018/12/03 2019/05/07~2019/05/15	Reviewer: Esmond

Test Sample Identification: Large Battery Small Battery Single-cell Battery

Battery Pack						Component Cell		
Used	Sample No.	Sample State	Used	Sample No.	Sample State	Used	Sample No.	Sample State
V	01~04	1 Cycle, Fully charged	V	05~08	25 Cycles, Fully charged	V	01C~05C	1 Cycle, 50% SOC
V	09~12	1 Cycle, Fully charged	V	13~16	25 Cycles, Fully charged	V	06C~10C	25 Cycles, 50% SOC
						V	11C~20C	1 Cycle, Fully discharged (0% SOC)
						V	21C~30C	25 Cycles, Fully discharged (0% SOC)

T.1 Altitude Simulation

Start time: 2018/11/19 09:00	Ambient temp.: 22.7 °C						Operator: Mia		
Finish time: 2018/11/19 16:20	Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08	
OCV (V)	Before	8.369	8.366	8.363	8.370	8.367	8.365	8.372	8.368
	After	8.362	8.362	8.350	8.361	8.355	8.357	8.366	8.358
	Residual OCV %	99.92%	99.95%	99.84%	99.89%	99.86%	99.90%	99.93%	99.88%
Mass (g)	Before	243.435	243.492	243.462	243.455	243.479	243.483	243.438	243.468
	After	243.432	243.491	243.458	243.453	243.479	243.483	243.435	243.466
	Mass loss %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Results	P	P	P	P	P	P	P	P	

T.2 Thermal Test

Start time: 2018/11/19 16:40	Ambient temp.: 22.5 °C						Operator: Mia		
Finish time: 2018/11/26 09:00	Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08	
OCV (V)	Before	8.362	8.362	8.350	8.361	8.355	8.357	8.366	8.358
	After	8.268	8.270	8.264	8.273	8.264	8.267	8.270	8.269
	Residual OCV %	98.88%	98.90%	98.97%	98.95%	98.91%	98.92%	98.85%	98.94%
Mass (g)	Before	243.432	243.491	243.458	243.453	243.479	243.483	243.435	243.466
	After	243.409	243.474	243.445	243.439	243.466	243.462	243.416	243.448
	Mass loss %	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
Results	P	P	P	P	P	P	P	P	

T.3 Vibration

Start time: 2018/11/26 09:20	Ambient temp.: 23.2 °C						Operator: Mia		
Finish time: 2018/11/27 08:50	Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08	
OCV (V)	Before	8.268	8.270	8.264	8.273	8.264	8.267	8.270	8.269
	After	8.257	8.262	8.257	8.260	8.252	8.261	8.261	8.264
	Residual OCV %	99.87%	99.90%	99.92%	99.84%	99.85%	99.93%	99.89%	99.94%
Mass (g)	Before	243.409	243.474	243.445	243.439	243.466	243.462	243.416	243.448
	After	243.406	243.470	243.445	243.437	243.466	243.461	243.415	243.448
	Mass loss %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Results	P	P	P	P	P	P	P	P	

T.4 Shock

Start time: 2018/11/27 09:10	Ambient temp.: 22.9 °C						Operator: Mia		
Finish time: 2018/11/27 13:10	Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08	
OCV (V)	Before	8.257	8.262	8.257	8.260	8.252	8.261	8.261	8.264
	After	8.250	8.256	8.250	8.255	8.244	8.257	8.255	8.261
	Residual OCV %	99.92%	99.93%	99.92%	99.94%	99.90%	99.95%	99.93%	99.96%
Mass (g)	Before	243.406	243.470	243.445	243.437	243.466	243.461	243.415	243.448
	After	243.406	243.466	243.443	243.437	243.465	243.458	243.410	243.444
	Mass loss %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Results	P	P	P	P	P	P	P	P	

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Control Number: SLEU-1905006

T.5 External Short Circuit

Start time: 2018/11/27 13:30		Ambient temp.: 23.3 °C						Operator: Mia	
Finish time: 2018/11/28 09:00		Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	8.250	8.256	8.250	8.255	8.244	8.257	8.255	8.261
	After	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Resistance (<100mΩ)		58.6	56.7	58.2	60.3	57.7	60.9	57.1	56.4
Max Temp. (< 170°C)		57.4	57.4	57.5	57.9	57.3	57.7	57.6	57.8
Results		P	P	P	P	P	P	P	P

T.6 Impact / Crush (Component Cell)

UN38.3/ST/SG/AC.10/11/Rev.6/Amend.1

Impact - Cylindrical cells not less than 18.0 mm in diameter

Crush - Prismatic, pouch, coin/button cells and cylindrical cells less than 18.0 mm in diameter

Start time: 2019/05/15 09:00		Ambient temp.: 23.6 °C				Operator: Mia	
Finish time: 2019/05/15 12:00		Sample 01C	Sample 02C	Sample 03C	Sample 04C	Sample 05C	
Initial OCV (V)		3.802	3.796	3.794	3.803	3.799	
Max Temp. (< 170°C)		23.8	23.2	24.0	24.1	23.6	
Results		P	P	P	P	P	
Sample No.		Sample 06C	Sample 07C	Sample 08C	Sample 09C	Sample 10C	
Initial OCV (V)		3.808	3.800	3.793	3.805	3.801	
Max Temp. (< 170°C)		24.4	23.4	23.8	24.6	23.9	
Results		P	P	P	P	P	

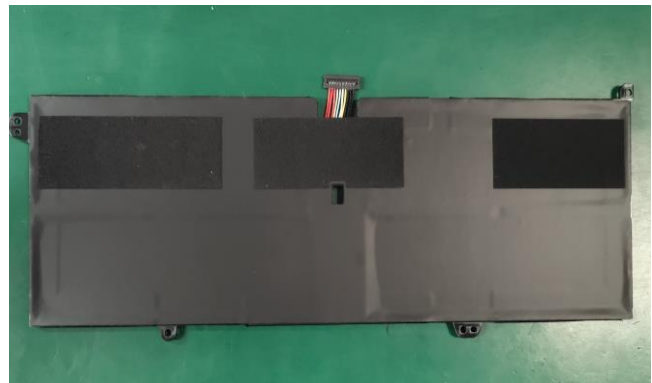
T.7 Overcharge

Start time: 2018/11/22 09:40		Ambient temp.: 22.9 °C						Operator: Mia	
Finish time: 2018/11/30 11:00		Sample 09	Sample 10	Sample 11	Sample 12	Sample 13	Sample 14	Sample 15	Sample 16
Initial OCV (V)		8.372	8.364	8.366	8.372	8.364	8.360	8.375	8.366
Results		P	P	P	P	P	P	P	P

T.8 Forced Discharge (Component Cell)

Start time: 2018/11/23 09:00		Ambient temp.: 22.7 °C						Operator: Mia	
Finish time: 2018/12/03 09:00		Sample 11C	Sample 12C	Sample 13C	Sample 14C	Sample 15C	Sample 16C	Sample 17C	Sample 18C
Initial OCV (V)		3.468	3.425	3.447	3.444	3.454	3.432	3.461	3.450
Results		P	P	P	P	P	P	P	P
Sample No.		Sample 19C	Sample 20C	Sample 21C	Sample 22C	Sample 23C	Sample 24C	Sample 25C	Sample 26C
Initial OCV (V)		3.457	3.433	3.429	3.463	3.440	3.452	3.437	3.422
Results		P	P	P	P	P	P	P	P
Sample No.		Sample 27C	Sample 28C	Sample 29C	Sample 30C				
Initial OCV (V)		3.424	3.430	3.458	3.445				
Results		P	P	P	P				

9. Test Sample:



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