



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-2011002

Rechargeable Li-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: L20M4P75

Rating/ Mass: 15.52V, Typical Capacity 5805mAh/ 90.1Wh

Rated Capacity 5680mAh/ 88.2Wh /340 (g)

Issue date: 2020/11/17

Approved By	Checked By	Prepared By
Project Manager	Authorized Signatory	Test Engineer
		

●	SIMPLO TECHNOLOGY CO., LTD. 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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	SIMPLO TECHNOLOGY (CHONGQING) INC. ADD : No.2 Zongbao Avenue, Shapingba District, ChongQing, China TEL: +86-23-61718899 FAX: +86-23-61210488	
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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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Control Number: SLEU-2011002

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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Control Number: SLEU-2011002

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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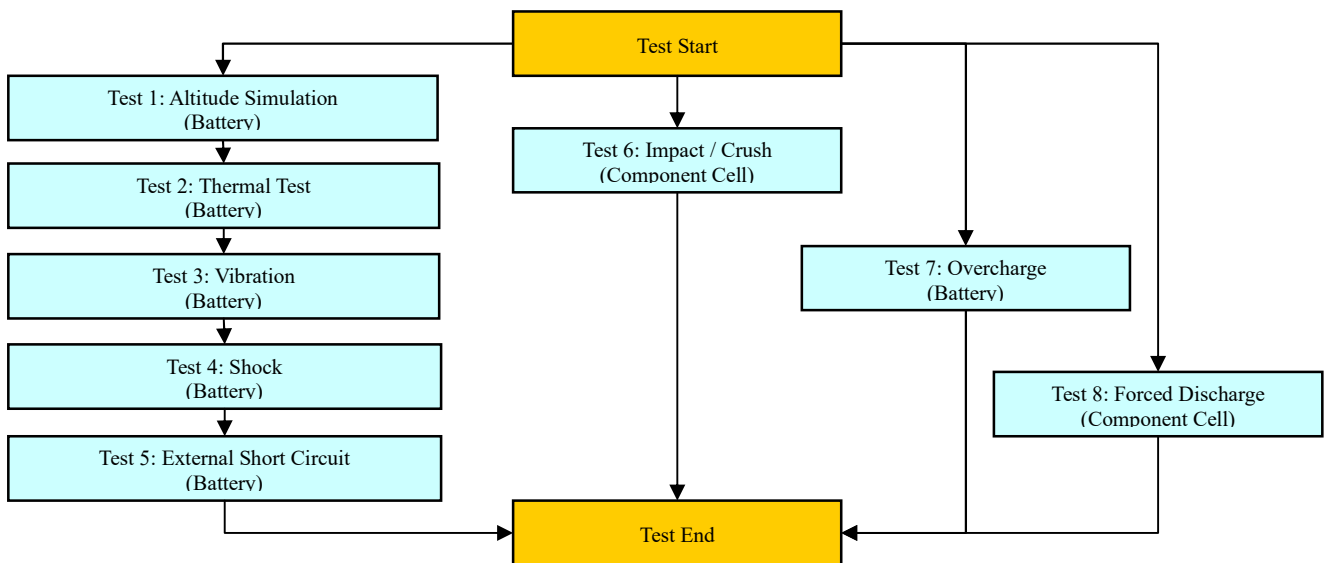
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6. Test Procedure :

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 : NA



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8. Test Equipment :

SMP SIMPLO TECHNOLOGY CO., LTD.

Address : No.471, Sec.2, Pa Teh Rd., Hu Kou, Hsin Chu Hsien 303, Taiwan

TEL: +886-3-5695920; FAX: +886-3-5695931

Revised Date: 2020-11-17

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	2020/2/19	2021/3/19	
V	ML-762	Learning	715C	0~18V 0~8A	SMP	2020/1/2	2021/2/2	
V	ML-763	Learning	715C	0~18V 0~8A	SMP	2020/2/19	2021/3/19	
V	ML-764	Learning	715C	0~18V 0~8A	SMP	2020/1/2	2021/2/2	
	ML-925	Learning	750C8	0~60V 0~30A	SMP	2020/1/2	2021/2/2	
	T.1 Altitude Simulation							
V	ML-522	Altitude	SVT-120	kPa:30~90	HSIN JIANG	2020/7/1	2021/8/1	
V	ML-257	Multimeter	34401A	Note 1	Agilent	2020/7/23	2021/8/23	
V	ML-494	Electronic Balance	XS1220M-SCS	1-1220 gf	PRECISA	2020/7/1	2021/8/1	
	ML-523	Electronic Balance	MTW-30K	30*0.005kg		2020/8/11	2021/9/11	
V	ML-550	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2020/8/6	2021/9/6	
V	ML-964	Barometric Air Pressure	MP55	750 to 1100 mbar	KIMO	2020/7/3	2021/8/3	
	T.2 Thermal Test							
V	ML-789	Thermal Shock	GTST-080-65-AW	T:-40 to 100°C	GF	2020/7/2	2021/8/2	
V	ML-257	Multimeter	34401A	note 1	Agilent	2020/7/23	2021/8/23	
V	ML-494	Electronic Balance	XS1220M-SCS	1-1220 gf	PRECISA	2020/7/1	2021/8/1	
	ML-523	Electronic Balance	MTW-30K	30*0.005kg		2020/8/11	2021/9/11	
V	ML-551	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2020/8/6	2021/9/6	
	T.3 Vibration							
V	ML-233	Vibration	KD-9636-EM-300F2K-30N80	F:5~2000Hz G:0.2~20G	King Design	2020/8/3	2021/9/3	
V	ML-257	Multimeter	34401A	note 1	Agilent	2020/7/23	2021/8/23	
V	ML-494	Electronic Balance	XS1220M-SCS	1-1220 gf	PRECISA	2020/7/1	2021/8/1	
	ML-523	Electronic Balance	MTW-30K	30*0.005kg		2020/8/11	2021/9/11	
V	ML-552	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2020/8/6	2021/9/6	
	T.4 Shock							
V	ML-056	Shock	DP-1200-25	G:10~600G	King Design	2020/8/3	2021/9/3	
V	ML-257	Multimeter	34401A	note 1	Agilent	2020/7/23	2021/8/23	
V	ML-494	Electronic Balance	XS1220M-SCS	1-1220 gf	PRECISA	2020/7/1	2021/8/1	
	ML-523	Electronic Balance	MTW-30K	30*0.005kg		2020/8/11	2021/9/11	
V	ML-551	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2020/8/6	2021/9/6	
	T.5 External Short Circuit							
V	ML-894	Battery Hister	BT3562	1mΩ ~ 30kΩ	HIOKI	2020/6/9	2021/7/9	
V	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200°C	Yokogawa	2020/8/11	2021/9/11	
V	ML-460	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200°C	Yokogawa	2020/8/11	2021/9/11	
V	ML-521	Oven	9031	30~80 °C	YEOW LONG	2020/8/11	2021/9/11	
V	ML-952	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2020/7/2	2021/8/2	
	T.6 Impact / Crush							
V	ML-458	Data Acquisition	XL122-D	1-100 Vdc, -50 to 150°C	Yokogawa	2020/6/3	2021/7/3	
	ML-076	Impact Tester			JYI SHENG	2020/1/6	2021/2/6	
	ML-553	Crush Tester	BCT-01		Simplo	2020/4/8	2021/5/8	
V	ML-866	Crush Tester	M0654		JYI SHENG	2020/4/8	2021/5/8	
	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200°C	Yokogawa	2020/8/11	2021/9/11	

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Revised Date: 2020-11-17

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	2020/5/7	2021/6/7	
	ML-483	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2020/5/7	2021/6/7	
	ML-484	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2020/5/7	2021/6/7	
	ML-486	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2020/5/7	2021/6/7	
	ML-487	Programmable DC Source	DS6024	1-60 Vdc, 0.3-24A	MOTECH	2020/5/7	2021/6/7	
V	ML-952	Data Logger	313	15~35 ℃; 30~80 %RH	CENTER	2020/7/2	2021/8/2	
	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200℃	Yokogawa	2020/8/11	2021/9/11	
	ML-460	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200℃	Yokogawa	2020/8/11	2021/9/11	
V	ML-918	Overcharge & Forced discharge tester	T901	3~30 Vdc, Charge: 0.05~20A Discharge: 0.02~10A	SMP	2020/5/7	2021/6/7	
	T.8 Forced Discharge							
	ML-132	Electronic Load	3311C	60V,60A, 300W	Prodigit	2020/2/20	2021/3/20	
	ML-133	Electronic Load	3311C	60V,60A, 300W	Prodigit	2020/2/20	2021/3/20	
	ML-136	Electronic Load	3311C	60V,60A, 300W	Prodigit	2020/2/20	2021/3/20	
	ML-192	Electronic Load	3311C	60V,60A, 300W	Prodigit	2020/2/20	2021/3/20	
	ML-269	Electronic Load	3311C	60V,60A, 300W	Prodigit	2020/2/20	2021/3/20	
	ML-532	DC Electronic Load	33511-01	120V, 240A, 3600W	Prodigit	2020/7/1	2021/8/1	
	ML-482	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2020/5/7	2021/6/7	
	ML-483	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2020/5/7	2021/6/7	
	ML-484	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2020/5/7	2021/6/7	
	ML-486	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2020/5/7	2021/6/7	
	ML-487	Programmable DC Source	DS6024	1-60 Vdc, 0.3-24A	MOTECH	2020/5/7	2021/6/7	
V	ML-952	Data Logger	313	15~35 ℃; 30~80 %RH	CENTER	2020/7/2	2021/8/2	
	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200℃	Yokogawa	2020/8/11	2021/9/11	
	ML-460	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200℃	Yokogawa	2020/8/11	2021/9/11	
V	ML-918	Overcharge & Forced discharge tester	T901	3~30 Vdc, Charge: 0.05~20A Discharge: 0.02~10A	SMP	2020/5/7	2021/6/7	
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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Control Number: SLEU-2011002

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-2011002	Customer: Lenovo	Model Name: L20M4P75	SMP Project Name: Cheetah
Pack P/N: 931QA215H (B) 931QA216H (B)	Configuration: 4S1P	Test Duration: 2020/10/28~2020/11/16	Reviewer: Esmond
Cell Vendor: ATL	Cell Model: 4156E1	N/A	N/A

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: 2020/11/05 08:53		Ambient temp.: 23.6 °C					Operator: Martin		
Finish time: 2020/11/05 16:00		Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	17.335	17.329	17.330	17.326	17.334	17.337	17.331	17.328
	After	17.321	17.312	17.318	17.311	17.324	17.320	17.317	17.316
	Residual OCV %	99.92%	99.90%	99.93%	99.91%	99.94%	99.90%	99.92%	99.93%
Mass (g)	Before	339.956	340.208	340.115	339.972	339.994	340.084	340.139	340.188
	After	339.948	340.202	340.108	339.964	339.988	340.077	340.130	340.181
	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: 2020/11/05 16:20		Ambient temp.: 24.0 °C					Operator: Martin		
Finish time: 2020/11/12 08:48		Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	17.321	17.312	17.318	17.311	17.324	17.320	17.317	17.316
	After	17.128	17.124	17.126	17.124	17.134	17.131	17.126	17.122
	Residual OCV %	98.89%	98.91%	98.89%	98.92%	98.90%	98.91%	98.90%	98.88%
Mass (g)	Before	339.948	340.202	340.108	339.964	339.988	340.077	340.130	340.181
	After	339.927	340.183	340.084	339.941	339.970	340.052	340.106	340.155
	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: 2020/11/12 09:10		Ambient temp.: 23.1 °C					Operator: Martin		
Finish time: 2020/11/13 09:25		Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	17.128	17.124	17.126	17.124	17.134	17.131	17.126	17.122
	After	17.115	17.114	17.110	17.110	17.122	17.115	17.114	17.109
	Residual OCV %	99.92%	99.94%	99.91%	99.92%	99.93%	99.91%	99.93%	99.92%
Mass (g)	Before	339.927	340.183	340.084	339.941	339.970	340.052	340.106	340.155
	After	339.920	340.177	340.079	339.934	339.963	340.046	340.099	340.149
	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: 2020/11/13 09:50		Ambient temp.: 22.8 °C					Operator: Martin		
Finish time: 2020/11/13 14:50		Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	17.115	17.114	17.110	17.110	17.122	17.115	17.114	17.109
	After	17.100	17.102	17.097	17.101	17.108	17.105	17.101	17.099
	Residual OCV %	99.91%	99.93%	99.92%	99.95%	99.92%	99.94%	99.92%	99.94%
Mass (g)	Before	339.920	340.177	340.079	339.934	339.963	340.046	340.099	340.149
	After	339.915	340.171	340.075	339.929	339.960	340.042	340.094	340.145
	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-2011002

T.5 External Short Circuit

Start time: 2020/11/16 09:00	Ambient temp.: 23.3 °C				Operator: Martin			
Finish time: 2020/11/16 17:57	Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	17.083	17.084	17.081	17.082	17.091	17.087	17.085
	After	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Resistance (<100mΩ)		59.4	60.3	57.8	58.0	59.9	60.7	61.4
Max Temp. (< 170°C)		57.3	57.9	57.4	57.7	57.6	57.2	57.4
Results		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: 2020/11/06 13:06	Ambient temp.: 23.8 °C				Operator: Martin			
Finish time: 2020/11/06 17:30	Sample 01C	Sample 02C	Sample 03C	Sample 04C	Sample 05C			
Initial OCV (V)	3.843	3.836	3.830	3.844	3.847			
Max Temp. (< 170°C)	24.3	24.5	24.0	24.6	24.8			
Results	P	P	P	P	P			
Sample No.	Sample 06C	Sample 07C	Sample 08C	Sample 09C	Sample 10C			
Initial OCV (V)	3.834	3.849	3.841	3.835	3.840			
Max Temp. (< 170°C)	24.1	23.8	24.4	24.0	24.3			
Results	P	P	P	P	P			

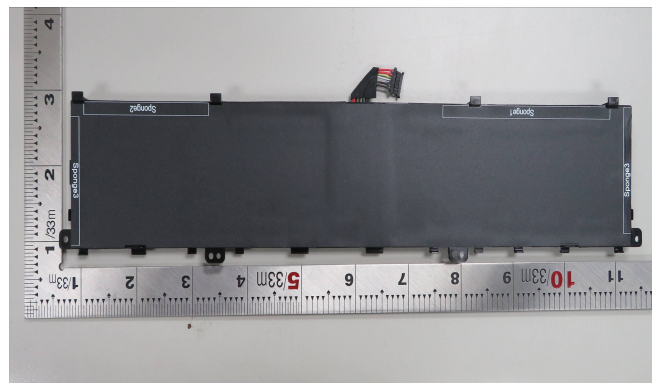
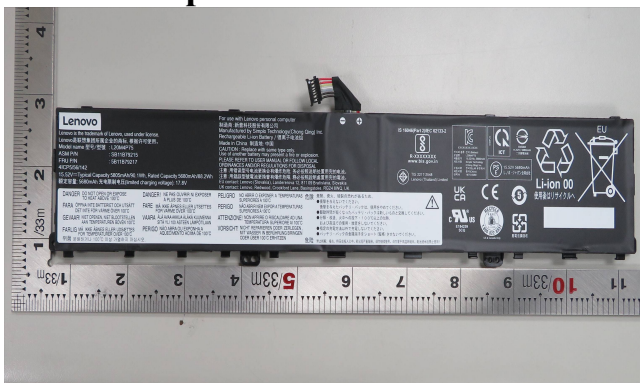
T.7 Overcharge

Start time: 2020/11/05 10:20	Ambient temp.: 23.9 °C				Operator: Martin			
Finish time: 2020/11/13 12:00	Sample 09	Sample 10	Sample 11	Sample 12	Sample 13	Sample 14	Sample 15	Sample 16
Initial OCV (V)	17.335	17.323	17.333	17.326	17.339	17.337	17.332	17.324
Results	P	P	P	P	P	P	P	P

T.8 Forced Discharge (Component Cell)

Start time: 2020/11/06 09:12	Ambient temp.: 23.6 °C				Operator: Martin			
Finish time: 2020/11/16 08:38	Sample 11C	Sample 12C	Sample 13C	Sample 14C	Sample 15C	Sample 16C	Sample 17C	Sample 18C
Initial OCV (V)	3.475	3.446	3.450	3.447	3.463	3.479	3.451	3.439
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)	3.460	3.472	3.458	3.443	3.466	3.442	3.470	3.461
Results	P	P	P	P	P	P	P	P
Sample No.	Sample 27C	Sample 28C	Sample 29C	Sample 30C				
Initial OCV (V)	3.446	3.454	3.474	3.440				
Results	P	P	P	P				

9. Test Sample:



Form No. : W11-002-B05

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This test report is valid only to the items, Invalid for separation using.