



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-1903001

# Lithium-ion Battery UN38.3 Test Report

## Recommendations on the TRANSPORT OF DANGEROUS GOODS

(Manual of Tests and Criteria, Sixth revised edition)

**Customer: Lenovo**

**Model: L19M3P71**

**Rating: 11.52V, Typical Capacity 4380mAh/ 50Wh**

**Rated Capacity 4250mAh/ 49Wh**

**Issue date: 2019/03/13**

Approved By	Checked By	Prepared By
<i>sting sin</i>	<i>gsmh</i>	<b>Kenny</b>

SIMPLO TECHNOLOGY CO., LTD.

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

TEL: +886-3-5695920

FAX: +886-3-5695931



SIMPLO TECHNOLOGY (CHANGSHU) INC.

ADD : No.888 Dongnan Avenue, Changshu New & Hi-Tech Industrial Development Zone, Changshu, Jiangsu, China

TEL: +86-512-52302255

FAX: +86-512-52302277



SIMPLO TECHNOLOGY (CHONGQING) INC.

ADD : No.2 Zongbao Avenue, Shapingba District, ChongQing, China

TEL: +86-23-61718899

FAX: +86-23-61210488



HUAPU TECHNOLOGY (CHANGSHU) INC.

ADD : No.888 Dongnan Avenue, Changshu New & Hi-Tech Industrial Development Zone, Changshu, Jiangsu, China

TEL: +86-512-52302255

FAX: +86-512-52302277



Form No. : W11-002-B04

本資料為新普科技股份有限公司之智慧財產權，非經本公司書面授權許可，不得透露或使用本資料，亦不得複印、複製或轉變成其它任何形式使用。  
 The information contained herein is the exclusive property of SIMPLO TECHNOLOGY CO., LTD, and shall not be distributed, reproduced, or disclosed in whole or in part without prior written permission.

本測試報告僅對上述測試項目有效，本報告分離使用無效

Page 1 of 7

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



### 1. Purpose of the Test :

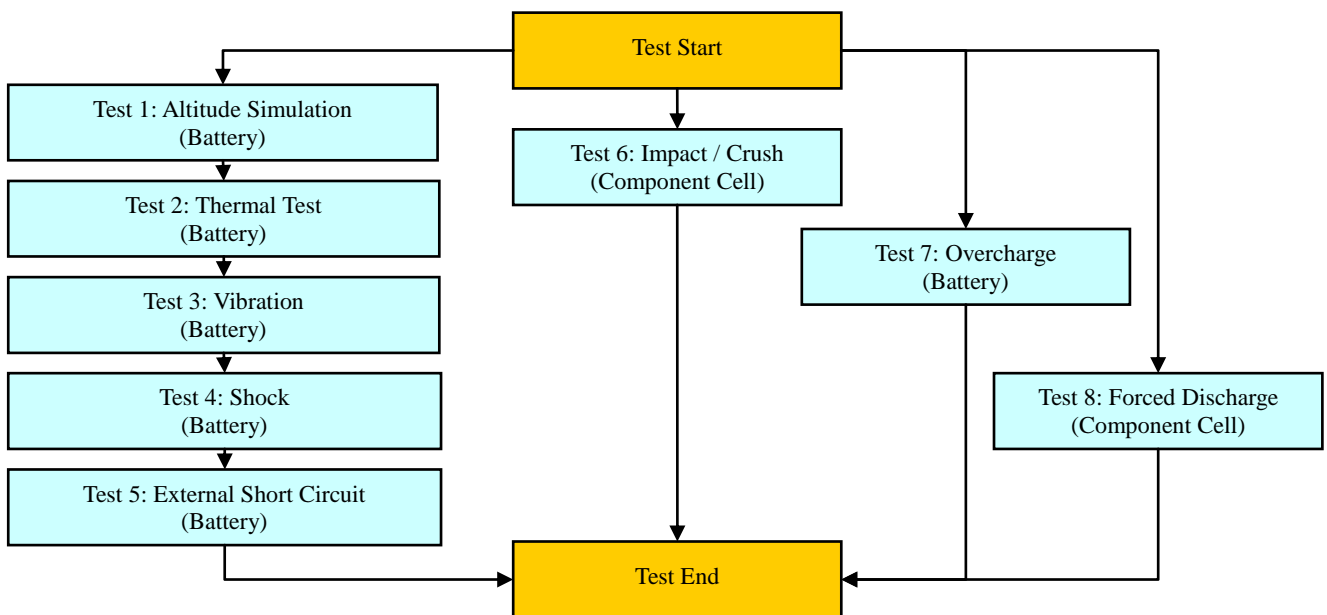
To test each cell/battery is of the type proved to meet the requirements in United Nations Recommendations on the TRANSPORT OF DANGEROUS GOODS, Manual of Tests and Criteria, Sixth revised edition, Section 38.3.

### 2. Test Quantity :

- 2.1 Four batteries, at first cycle, in fully charged states. (For T.1~T.5)
- 2.2 Four batteries, after 50 cycles ending in fully charged states. (For T.1~T.5)
- 2.3 Five component cells, at first cycle at 50% of the design rated capacity. (For T.6)
- 2.4 Four batteries, at first cycle, in fully charged states. (For T.7)
- 2.5 Four batteries, after 50 cycles ending in fully charged states. (For T.7)
- 2.6 Ten component cells, at first cycle in fully discharge states. (For T.8)
- 2.7 Ten component cells, after 50 cycles ending in fully discharged states. (For T.8)

### 3. Test Procedure :

- 3.1 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, Section 38.3.
- 3.2 Test flow shall be followed as below.





#### 4. Test Result :

##### 4.1 T.1 ~T.4 Test result: **Passed**

- 4.1.1 All batteries could meet the requirement of Table 38.3.1 Mass loss limit ( $M < 1g$ : 0.5% ;  $1g \leq M \leq 75g$ : 0.2% ;  $M > 75g$ : 0.1%) and residual OCV not less than 90% after the test.
- 4.1.2 No leakage, no venting, no disassembly, no rupture and no fire.

##### 4.2 T.5 Test result: **Passed**

- 4.2.1 All batteries could meet the requirement, external temperature did not exceed  $170^{\circ}\text{C}$ .
- 4.2.2 All batteries were no disassembly, no rupture and no fire during the test and within six hours after the test.

##### 4.3 T.6 Test result: **Passed**

- 4.3.1 All component cells could meet the requirement, external temperature did not exceed  $170^{\circ}\text{C}$ .
- 4.3.2 All component cells were no disassembly and no fire during the test and within six hours after the test.

##### 4.4 T.7 Test result: **Passed**

- 4.4.1 All batteries could meet no disassembly and no fire during the test and within seven days after the test.

##### 4.5 T.8 Test result: **Passed**

- 4.5.1 All component cells could meet the requirement, no disassembly and no fire during the test and within seven days after the test.

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



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-1903001

## 5. 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: 2019-03-13

Test Instruments Reference List								
Used	Instrument ID	Instrument Name	Type	Range of use	Manufacturer	Calibration Date_Last	Calibration Date_Next	Remarks
<b>Pretest</b>								
V	ML-761	Learning	715C	0~18V 0~8A	SMP	2019/2/26	2020/2/26	
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	
<b>T.1 Altitude Simulation</b>								
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	2019/3/1	2020/3/1	
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 °C; 30~80 %RH	CENTER	2018/9/18	2019/9/18	
<b>T.2 Thermal Test</b>								
V	ML-789	Thermal Shock	GTST-080-65-AW	T: -40 to 120°C	GF	2019/1/3	2020/1/3	
V	ML-257	Multimeter	HP 34401A	note 1	Agilent	2019/3/1	2020/3/1	
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-551	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2018/9/18	2019/9/18	
<b>T.3 Vibration</b>								
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	2019/3/1	2020/3/1	
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-552	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2018/9/18	2019/9/18	
<b>T.4 Shock</b>								
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	2019/3/1	2020/3/1	
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-551	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2018/9/18	2019/9/18	
<b>T.5 External Short Circuit</b>								
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°C	Yokogawa	2018/9/12	2019/9/12	
V	ML-460	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 150°C	Yokogawa	2018/9/12	2019/9/12	
V	ML-521	Oven	9031	30~80 °C	YEOW LONG	2018/9/12	2019/9/12	
V	ML-549	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2018/9/18	2019/9/18	
<b>T.6 Impact / Crush</b>								
V	ML-339	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 150°C	Yokogawa	2018/5/17	2019/5/17	
	ML-076	Impact Tester			JYI SHENG	2019/1/3	2020/1/3	
	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°C	Yokogawa	2018/9/12	2019/9/12	

Form No. : W11-002-B04

本資料為新普科技股份有限公司之智慧財產權，非經本公司書面授權許可，不得透露或使用本資料，亦不得複印、複製或轉變成其它任何形式使用。  
 The information contained herein is the exclusive property of SIMPLO TECHNOLOGY CO., LTD, and shall not be distributed, reproduced, or disclosed in whole or in part without prior written permission.

本測試報告僅對上述測試項目有效，本報告分離使用無效

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





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-1903001

**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: 2019-03-13

Test Instruments Reference List								
Used	Instrument ID	Instrument Name	Type	Range of use	Manufacturer	Calibration Date_Last	Calibration Date_Next	Remarks
<b>T.7 Overcharge</b>								
	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 ℃; 30~80 %RH	CENTER	2018/9/18	2019/9/18	
	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 150℃	Yokogawa	2018/9/12	2019/9/12	
	ML-460	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 150℃	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	
<b>T.8 Forced Discharge</b>								
	ML-132	Electronic Load	3311C	60V,55A, 300W	Prodigit	2019/1/3	2020/1/3	
	ML-133	Electronic Load	3311C	60V,55A, 300W	Prodigit	2019/1/3	2020/1/3	
	ML-136	Electronic Load	3311C	60V,55A, 300W	Prodigit	2019/1/3	2020/1/3	
	ML-192	Electronic Load	3311C	60V,55A, 300W	Prodigit	2019/1/3	2020/1/3	
	ML-269	Electronic Load	3311C	60V,55A, 300W	Prodigit	2019/1/3	2020/1/3	
	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 ℃; 30~80 %RH	CENTER	2018/9/18	2019/9/18	
	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 150℃	Yokogawa	2018/9/12	2019/9/12	
	ML-460	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 150℃	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.								

Form No. : W11-002-B04

本資料為新普科技股份有限公司之智慧財產權，非經本公司書面授權許可，不得透露或使用本資料，亦不得複印、複製或轉變成其它任何形式使用。  
 The information contained herein is the exclusive property of SIMPLO TECHNOLOGY CO., LTD, and shall not be distributed, reproduced, or disclosed in whole or in part without prior written permission.

本測試報告僅對上述測試項目有效,本報告分離使用無效  
 This test report is valid only to the items, Invalid for separation using.



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-1903001

## 6. T.1~T.8 Detail Reports:

### UN 38.3 Test Datasheet

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

Control Number: SLEU-1903001	Customer: Lenovo	Model Name: L19M3P71	SMP Project Name: Bumblebee_BYD
Pack P/N: 931QA129H (A)(B)	Configuration: 3S1P	Test Duration: 2019/02/11~2019/03/12	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	50 Cycles, Fully charged	V	01C~05C	1 Cycle, 50% SOC
V	09~12	1 Cycle, Fully charged	V	13~16	50 Cycles, Fully charged	V	06C~15C	1 Cycle, Fully discharged (0% SOC)
		25Cycles, Fully charged			25 Cycles, Fully charged	V	16C~25C	50 Cycles, Fully discharged (0% SOC)

#### T.1 Altitude Simulation

Start time: 2019/02/25 08:50	Ambient temp.: 22.6 °C								Operator: Kenny	
Finish time: 2019/02/25 16:00	Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08		
OCV (V)	Before	13.073	13.059	13.062	13.067	13.069	13.064	13.060	13.065	
	After	13.066	13.051	13.054	13.058	13.062	13.055	13.053	13.057	
	Residual OCV %	99.95%	99.94%	99.94%	99.93%	99.95%	99.93%	99.95%	99.94%	
Mass (g)	Before	198.573	199.828	199.764	198.918	198.884	199.479	198.691	199.626	
	After	198.570	199.828	199.762	198.917	198.881	199.479	198.689	199.623	
	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	P	

#### T.2 Thermal Test

Start time: 2019/02/25 16:20	Ambient temp.: 22.3 °C								Operator: Kenny	
Finish time: 2019/03/04 08:50	Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08		
OCV (V)	Before	13.066	13.051	13.054	13.058	13.062	13.055	13.053	13.057	
	After	12.911	12.891	12.897	12.907	12.902	12.898	12.895	12.903	
	Residual OCV %	98.81%	98.77%	98.80%	98.84%	98.78%	98.80%	98.79%	98.82%	
Mass (g)	Before	198.570	199.828	199.762	198.917	198.881	199.479	198.689	199.623	
	After	198.552	199.808	199.743	198.902	198.867	199.463	198.672	199.602	
	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	P	

#### T.3 Vibration

Start time: 2019/03/04 09:10	Ambient temp.: 21.9 °C								Operator: Kenny	
Finish time: 2019/03/05 08:40	Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08		
OCV (V)	Before	12.911	12.891	12.897	12.907	12.902	12.898	12.895	12.903	
	After	12.902	12.877	12.885	12.894	12.892	12.886	12.886	12.893	
	Residual OCV %	99.93%	99.89%	99.91%	99.90%	99.92%	99.91%	99.93%	99.92%	
Mass (g)	Before	198.552	199.808	199.743	198.902	198.867	199.463	198.672	199.602	
	After	198.552	199.806	199.738	198.899	198.866	199.463	198.672	199.599	
	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	P	

#### T.4 Shock

Start time: 2019/03/05 09:00	Ambient temp.: 22.0 °C								Operator: Kenny	
Finish time: 2019/03/05 11:30	Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08		
OCV (V)	Before	12.902	12.877	12.885	12.894	12.892	12.886	12.886	12.893	
	After	12.897	12.874	12.881	12.893	12.889	12.882	12.881	12.892	
	Residual OCV %	99.96%	99.98%	99.97%	99.99%	99.98%	99.97%	99.96%	99.99%	
Mass (g)	Before	198.552	199.806	199.738	198.899	198.866	199.463	198.672	199.599	
	After	198.550	199.806	199.735	198.895	198.865	199.463	198.669	199.599	
	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	P	

Form No. : W11-002-B04

本資料為新普科技股份有限公司之智慧財產權，非經本公司書面授權許可，不得透露或使用本資料，亦不得複印、複製或轉變成其它任何形式使用。  
 The information contained herein is the exclusive property of SIMPLO TECHNOLOGY CO., LTD, and shall not be distributed, reproduced, or disclosed in whole or in part without prior written permission.

本測試報告僅對上述測試項目有效，本報告分離使用無效

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



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-1903001

**T.5 External Short Circuit**

Start time: 2019/03/05 11:50		Ambient temp.: 21.6 °C					Operator: Kenny		
Finish time: 2019/03/06 09:00		Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	12.897	12.874	12.881	12.893	12.889	12.882	12.881	12.892
	After	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Resistance (<100mΩ)		60.3	59.5	57.6	58.8	56.4	57.1	59.2	58.4
Max Temp. (< 170°C)		57.6	57.4	57.3	57.6	57.2	57.7	57.5	57.3
Results		P	P	P	P	P	P	P	P

**T.6 Impact / Crush (Component Cell)**

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

- 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: 2019/02/25 10:00		Ambient temp.: 22.1 °C				Operator: Kenny	
Finish time: 2019/02/26 09:00		Sample 01C	Sample 02C	Sample 03C	Sample 04C	Sample 05C	
Initial OCV (V)		3.796	3.804	3.797	3.792	3.806	
Max Temp. (< 170°C)		24.2	23.7	23.8	23.8	23.9	
Results		P	P	P	P	P	

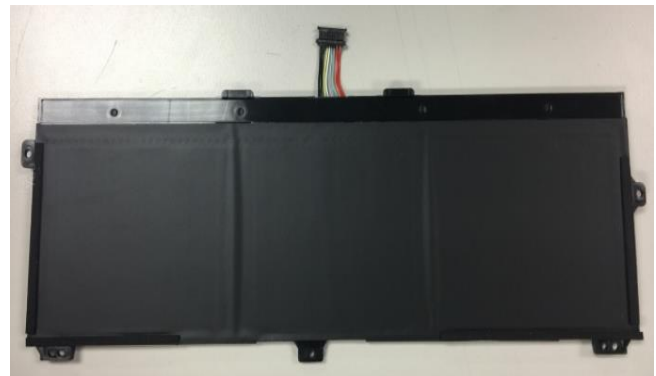
**T.7 Overcharge**

Start time: 2019/03/04 09:40		Ambient temp.: 21.9 °C					Operator: Kenny		
Finish time: 2019/03/12 11:00		Sample 09	Sample 10	Sample 11	Sample 12	Sample 13	Sample 14	Sample 15	Sample 16
Initial OCV (V)		13.070	13.060	13.058	13.070	13.065	13.068	13.057	13.066
Results		P	P	P	P	P	P	P	P

**T.8 Forced Discharge (Component Cell)**

Start time: 2019/02/26 09:30		Ambient temp.: 21.8 °C							Operator: Kenny	
Finish time: 2019/03/06 10:50		Sample 06C	Sample 07C	Sample 08C	Sample 09C	Sample 10C	Sample 11C	Sample 12C	Sample 13C	
Initial OCV (V)		3.443	3.432	3.428	3.449	3.454	3.436	3.441	3.430	
Results		P	P	P	P	P	P	P	P	
Sample No.		Sample 14C	Sample 15C	Sample 16C	Sample 17C	Sample 18C	Sample 19C	Sample 20C	Sample 21C	
Initial OCV (V)		3.423	3.457	3.435	3.445	3.422	3.450	3.433	3.442	
Results		P	P	P	P	P	P	P	P	
Sample No.		Sample 22C	Sample 23C	Sample 24C	Sample 25C					
Initial OCV (V)		3.453	3.426	3.427	3.439					
Results		P	P	P	P					

**7. Test Sample:**



Form No. : W11-002-B04

本資料為新普科技股份有限公司之智慧財產權，非經本公司書面授權許可，不得透露或使用本資料，亦不得複印、複製或轉變成其它任何形式使用。  
 The information contained herein is the exclusive property of SIMPLO TECHNOLOGY CO., LTD, and shall not be distributed, reproduced, or disclosed in whole or in part without prior written permission.

本測試報告僅對上述測試項目有效，本報告分離使用無效  
 This test report is valid only to the items, Invalid for separation using.