



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-1907001

# 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: L19M4PG1**

**Rating/ Mass: 15.36V, Typical Capacity 3000mAh/ 46Wh**

**Rated Capacity 2925mAh/ 44.7Wh/ 182 (g)**

**Issue date: 2019/07/19**

| Approved By       | Checked By           | Prepared By   |
|-------------------|----------------------|---------------|
| Assistant Manager | Authorized Signatory | Test Engineer |
|                   |                      |               |

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Email : [Test\\_Lab@simplo.com.tw](mailto:Test_Lab@simplo.com.tw)

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

Form No. : W11-002-B05

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Control Number: SLEU-1907001

### 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](mailto:Test_Lab@simplo.com.tw) Website : <http://www.simplo.com.tw/>

|   |  |
|---|--|
| ● | SIMPLO (Taiwan) Laboratory<br>ADD : No. 471 Pa Teh Rd, Sec 2 Hu Kou, Hsinchu Hsien, 303 Taiwan<br>TEL: +886-3-5695920                      FAX: +886-3-5695931   |
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Control Number: SLEU-1907001

**4. Product manufacturer : Email : [Test\\_Lab@simplo.com.tw](mailto: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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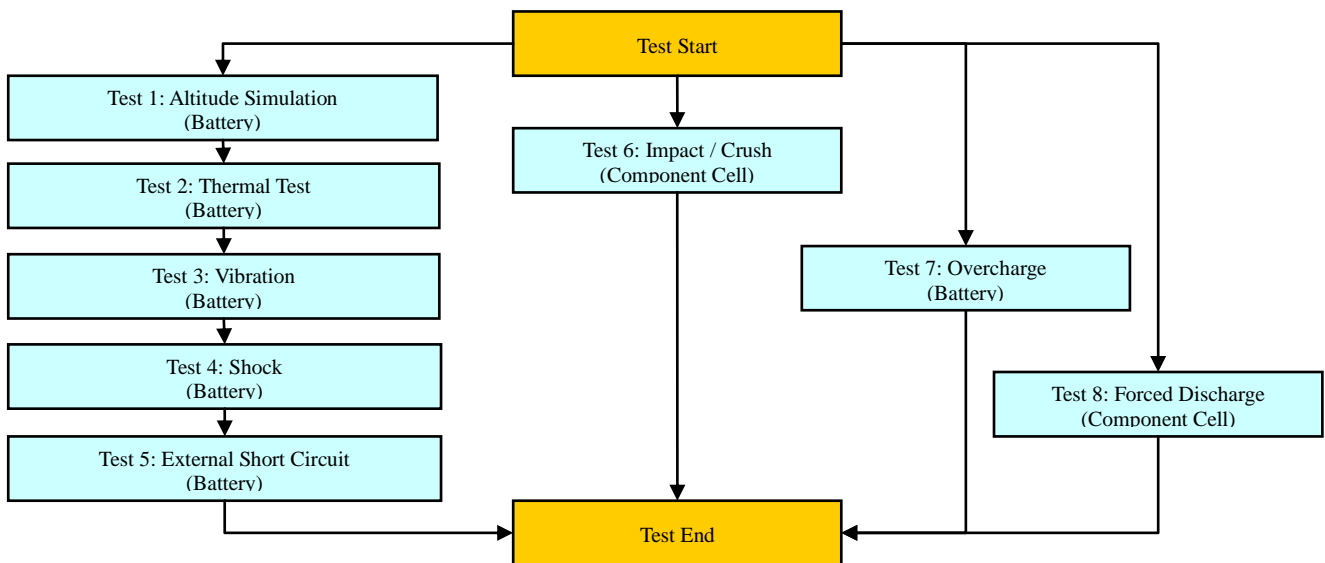
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## 6. Test Procedure :

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 :

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Revised Date: 2019-07-19

| 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          | 2019/2/25             | 2020/2/25             |         |
| 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   | 2019/7/18             | 2020/7/18             |         |
| V                                 | ML-257        | Multimeter              | 34401A                  | Note 1                  | Agilent      | 2019/2/26             | 2020/2/26             |         |
| V                                 | ML-494        | Electronic Balance      | XS1220M-SCS             | 1-1220 gf               | PRECISA      | 2019/7/18             | 2020/7/18             |         |
|                                   | 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             |         |
| V                                 | ML-555        | Barometric Air Pressure | C300                    | 750 to 1100 mbar        | Lufft        | 2018/9/18             | 2019/9/18             |         |
| <b>T.2 Thermal Test</b>           |               |                         |                         |                         |              |                       |                       |         |
| V                                 | ML-789        | Thermal Shock           | GTST-080-65-AW          | T: -40 to 100°C         | GF           | 2019/1/3              | 2020/1/3              |         |
| V                                 | ML-257        | Multimeter              | 34401A                  | note 1                  | Agilent      | 2019/2/26             | 2020/2/26             |         |
| V                                 | ML-494        | Electronic Balance      | XS1220M-SCS             | 1-1220 gf               | PRECISA      | 2019/7/18             | 2020/7/18             |         |
|                                   | 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<br>G:0.2~20G | King Design  | 2018/8/24             | 2019/8/24             |         |
| V                                 | ML-257        | Multimeter              | 34401A                  | note 1                  | Agilent      | 2019/2/26             | 2020/2/26             |         |
| V                                 | ML-494        | Electronic Balance      | XS1220M-SCS             | 1-1220 gf               | PRECISA      | 2019/7/18             | 2020/7/18             |         |
|                                   | 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              | 34401A                  | note 1                  | Agilent      | 2019/2/26             | 2020/2/26             |         |
| V                                 | ML-494        | Electronic Balance      | XS1220M-SCS             | 1-1220 gf               | PRECISA      | 2019/7/18             | 2020/7/18             |         |
|                                   | 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-894        | Battery Hitester        | BT3562                  | 1mΩ ~ 30kΩ              | HIOKI        | 2019/6/11             | 2020/6/11             |         |
| V                                 | ML-459        | Data Acquisition        | MX100-E-1D              | 1-100 Vdc, -50 to 200°C | Yokogawa     | 2018/9/12             | 2019/9/12             |         |
| V                                 | ML-460        | Data Acquisition        | MX100-E-1D              | 1-100 Vdc, -50 to 200°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     | 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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Revised Date: 2019-07-19

| 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       | 2019/5/9              | 2020/5/9              |         |
|   | ML-483                      | Programmable DC Source               | DS10014    | 1-100Vdc, 0.3-14.4A                            | MOTECH       | 2019/5/9              | 2020/5/9              |         |
|   | ML-484                      | Programmable DC Source               | DS10014    | 1-100Vdc, 0.3-14.4A                            | MOTECH       | 2019/5/9              | 2020/5/9              |         |
|   | ML-486                      | Programmable DC Source               | DS10014    | 1-100Vdc, 0.3-14.4A                            | MOTECH       | 2019/5/9              | 2020/5/9              |         |
|   | ML-487                      | Programmable DC Source               | DS6024     | 1-60 Vdc, 0.3-24A                              | MOTECH       | 2019/5/9              | 2020/5/9              |         |
| 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 200℃                         | Yokogawa     | 2018/9/12             | 2019/9/12             |         |
|   | ML-460                      | Data Acquisition                     | MX100-E-1D | 1-100 Vdc, -50 to 200℃                         | 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          | 2019/5/10             | 2020/5/10             |         |
|   | <b>T.8 Forced Discharge</b> |                                      |            |  |              |                       |                       |         |
|   | ML-132                      | Electronic Load                      | 3311C      | 60V,60A, 300W                                  | Prodigit     | 2019/2/26             | 2020/2/26             |         |
|   | ML-133                      | Electronic Load                      | 3311C      | 60V,60A, 300W                                  | Prodigit     | 2019/2/26             | 2020/2/26             |         |
|   | ML-136                      | Electronic Load                      | 3311C      | 60V,60A, 300W                                  | Prodigit     | 2019/2/26             | 2020/2/26             |         |
|   | ML-192                      | Electronic Load                      | 3311C      | 60V,60A, 300W                                  | Prodigit     | 2019/2/26             | 2020/2/26             |         |
|   | ML-269                      | Electronic Load                      | 3311C      | 60V,60A, 300W                                  | Prodigit     | 2019/2/26             | 2020/2/26             |         |
|   | ML-532                      | DC Electronic Load                   | 33511-01   | 120V, 240A, 3600W                              | Prodigit     | 2019/7/18             | 2020/7/18             |         |
|   | ML-482                      | Programmable DC Source               | DS10014    | 1-100Vdc, 0.3-14.4A                            | MOTECH       | 2019/5/9              | 2020/5/9              |         |
|   | ML-483                      | Programmable DC Source               | DS10014    | 1-100Vdc, 0.3-14.4A                            | MOTECH       | 2019/5/9              | 2020/5/9              |         |
|   | ML-484                      | Programmable DC Source               | DS10014    | 1-100Vdc, 0.3-14.4A                            | MOTECH       | 2019/5/9              | 2020/5/9              |         |
|   | ML-486                      | Programmable DC Source               | DS10014    | 1-100Vdc, 0.3-14.4A                            | MOTECH       | 2019/5/9              | 2020/5/9              |         |
|   | ML-487                      | Programmable DC Source               | DS6024     | 1-60 Vdc, 0.3-24A                              | MOTECH       | 2019/5/9              | 2020/5/9              |         |
| 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 200℃                         | Yokogawa     | 2018/9/12             | 2019/9/12             |         |
|   | ML-460                      | Data Acquisition                     | MX100-E-1D | 1-100 Vdc, -50 to 200℃                         | 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          | 2019/5/10             | 2020/5/10             |         |
| 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-1907001

## 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-1907001 | Customer: Lenovo    | Model Name: L19M4PG1                 | SMP Project Name: Confucius |
| Pack P/N: 931QA132H (A)(B)   | Configuration: 4S1P | Test Duration: 2019/06/26-2019/07/18 | 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: 2019/07/04 09:00  | Ambient temp.: 24.2 °C |           |           |           |           | Operator: Martin |           |           |         |
| Finish time: 2019/07/04 16:10 | Sample 01              | Sample 02 | Sample 03 | Sample 04 | Sample 05 | Sample 06        | Sample 07 | Sample 08 |         |
| OCV (V)                       | Before                 | 17.085    | 17.133    | 17.097    | 17.138    | 17.102           | 17.089    | 17.093    | 17.127  |
|                               | After                  | 17.069    | 17.116    | 17.082    | 17.124    | 17.086           | 17.072    | 17.078    | 17.112  |
|                               | Residual OCV %         | 99.91%    | 99.90%    | 99.91%    | 99.92%    | 99.91%           | 99.90%    | 99.91%    | 99.91%  |
| Mass (g)                      | Before                 | 182.801   | 181.768   | 182.793   | 181.805   | 182.476          | 182.692   | 181.982   | 182.266 |
|                               | After                  | 182.800   | 181.766   | 182.793   | 181.802   | 182.476          | 182.688   | 181.980   | 182.263 |
|                               | 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: 2019/07/04 16:30  | Ambient temp.: 24.4 °C |           |           |           |           | Operator: Martin |           |           |         |
| Finish time: 2019/07/04 08:50 | Sample 01              | Sample 02 | Sample 03 | Sample 04 | Sample 05 | Sample 06        | Sample 07 | Sample 08 |         |
| OCV (V)                       | Before                 | 17.069    | 17.116    | 17.082    | 17.124    | 17.086           | 17.072    | 17.078    | 17.112  |
|                               | After                  | 16.877    | 16.928    | 16.888    | 16.935    | 16.901           | 16.880    | 16.887    | 16.924  |
|                               | Residual OCV %         | 98.88%    | 98.90%    | 98.86%    | 98.90%    | 98.92%           | 98.88%    | 98.88%    | 98.90%  |
| Mass (g)                      | Before                 | 182.800   | 181.766   | 182.793   | 181.802   | 182.476          | 182.688   | 181.980   | 182.263 |
|                               | After                  | 182.785   | 181.753   | 182.774   | 181.782   | 182.459          | 182.670   | 181.965   | 182.250 |
|                               | 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: 2019/07/11 09:10  | Ambient temp.: 23.9 °C |           |           |           |           | Operator: Martin |           |           |         |
| Finish time: 2019/07/12 09:00 | Sample 01              | Sample 02 | Sample 03 | Sample 04 | Sample 05 | Sample 06        | Sample 07 | Sample 08 |         |
| OCV (V)                       | Before                 | 16.877    | 16.928    | 16.888    | 16.935    | 16.901           | 16.880    | 16.887    | 16.924  |
|                               | After                  | 16.859    | 16.912    | 16.870    | 16.920    | 16.887           | 16.863    | 16.871    | 16.909  |
|                               | Residual OCV %         | 99.89%    | 99.91%    | 99.89%    | 99.91%    | 99.92%           | 99.90%    | 99.91%    | 99.91%  |
| Mass (g)                      | Before                 | 182.785   | 181.753   | 182.774   | 181.782   | 182.459          | 182.670   | 181.965   | 182.250 |
|                               | After                  | 182.783   | 181.750   | 182.773   | 181.782   | 182.456          | 182.668   | 181.965   | 182.249 |
|                               | 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: 2019/07/12 09:20  | Ambient temp.: 24.0 °C |           |           |           |           | Operator: Martin |           |           |         |
| Finish time: 2019/07/12 14:10 | Sample 01              | Sample 02 | Sample 03 | Sample 04 | Sample 05 | Sample 06        | Sample 07 | Sample 08 |         |
| OCV (V)                       | Before                 | 16.859    | 16.912    | 16.870    | 16.920    | 16.887           | 16.863    | 16.871    | 16.909  |
|                               | After                  | 16.847    | 16.898    | 16.853    | 16.908    | 16.872           | 16.850    | 16.861    | 16.897  |
|                               | Residual OCV %         | 99.93%    | 99.92%    | 99.90%    | 99.93%    | 99.91%           | 99.92%    | 99.94%    | 99.93%  |
| Mass (g)                      | Before                 | 182.783   | 181.750   | 182.773   | 181.782   | 182.456          | 182.668   | 181.965   | 182.249 |
|                               | After                  | 182.783   | 181.748   | 182.773   | 181.781   | 182.453          | 182.666   | 181.962   | 182.249 |
|                               | 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-1907001

**T.5 External Short Circuit**

| Start time: 2019/07/12 14:30  |        | Ambient temp.: 24.3 °C |           |           |           |           |           | Operator: Martin |           |
|-------------------------------|--------|------------------------|-----------|-----------|-----------|-----------|-----------|------------------|-----------|
| Finish time: 2019/07/15 09:10 |        | Sample 01              | Sample 02 | Sample 03 | Sample 04 | Sample 05 | Sample 06 | Sample 07        | Sample 08 |
| OCV (V)                       | Before | 16.847                 | 16.898    | 16.853    | 16.908    | 16.872    | 16.850    | 16.861           | 16.897    |
|                               | After  | 0.000                  | 0.000     | 0.000     | 0.000     | 0.000     | 0.000     | 0.000            | 0.000     |
| Resistance (<100mΩ)           |        | 57.3                   | 59.6      | 60.2      | 60.8      | 58.5      | 56.7      | 57.1             | 61.2      |
| Max Temp. (< 170°C)           |        | 57.7                   | 57.3      | 57.1      | 57.5      | 57.9      | 57.4      | 57.6             | 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/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: 2019/07/08 09:00  |  | Ambient temp.: 23.7 °C |            |            |            | Operator: Martin |  |
|-------------------------------|--|------------------------|------------|------------|------------|------------------|--|
| Finish time: 2019/07/09 09:10 |  | Sample 01C             | Sample 02C | Sample 03C | Sample 04C | Sample 05C       |  |
| Initial OCV (V)               |  | 3.805                  | 3.802      | 3.797      | 3.794      | 3.801            |  |
| Max Temp. (< 170°C)           |  | 24.8                   | 24.3       | 23.6       | 24.6       | 23.9             |  |
| Results                       |  | P                      | P          | P          | P          | P                |  |
| Sample No.                    |  | Sample 06C             | Sample 07C | Sample 08C | Sample 09C | Sample 10C       |  |
| Initial OCV (V)               |  | 3.799                  | 3.792      | 3.807      | 3.800      | 3.795            |  |
| Max Temp. (< 170°C)           |  | 23.5                   | 23.7       | 24.0       | 23.9       | 24.2             |  |
| Results                       |  | P                      | P          | P          | P          | P                |  |

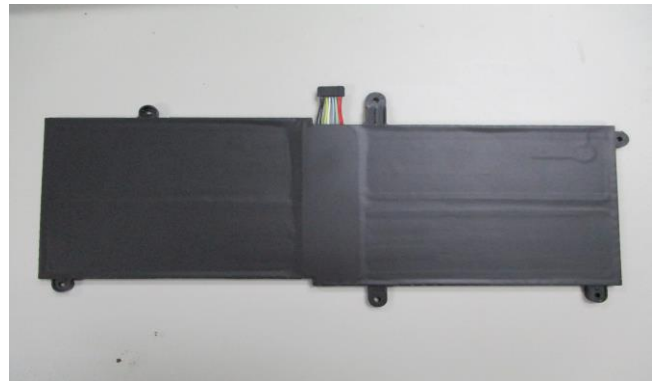
**T.7 Overcharge**

| Start time: 2019/07/09 09:30  |  | Ambient temp.: 24.0 °C |           |           |           |           |           | Operator: Martin |           |
|-------------------------------|--|------------------------|-----------|-----------|-----------|-----------|-----------|------------------|-----------|
| Finish time: 2019/07/17 11:00 |  | Sample 09              | Sample 10 | Sample 11 | Sample 12 | Sample 13 | Sample 14 | Sample 15        | Sample 16 |
| Initial OCV (V)               |  | 17.087                 | 17.130    | 17.095    | 17.142    | 17.100    | 17.092    | 17.094           | 17.126    |
| Results                       |  | P                      | P         | P         | P         | P         | P         | P                | P         |

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

| Start time: 2019/07/10 08:50  |  | Ambient temp.: 24.1 °C |            |            |            |            |            | Operator: Martin |            |
|-------------------------------|--|------------------------|------------|------------|------------|------------|------------|------------------|------------|
| Finish time: 2019/07/18 10:30 |  | Sample 11C             | Sample 12C | Sample 13C | Sample 14C | Sample 15C | Sample 16C | Sample 17C       | Sample 18C |
| Initial OCV (V)               |  | 3.435                  | 3.446      | 3.440      | 3.471      | 3.459      | 3.461      | 3.437            | 3.460      |
| 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)               |  | 3.478                  | 3.453      | 3.464      | 3.438      | 3.476      | 3.444      | 3.449            | 3.432      |
| Results                       |  | P                      | P          | P          | P          | P          | P          | P                | P          |
| Sample No.                    |  | Sample 27C             | Sample 28C | Sample 29C | Sample 30C |            |            |                  |            |
| Initial OCV (V)               |  | 3.473                  | 3.469      | 3.434      | 3.430      |            |            |                  |            |
| Results                       |  | P                      | P          | P          | P          |            |            |                  |            |

**9. Test Sample:**



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