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Control Number: SLEU-1809005

# 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: L18M3PG2**

**Rating: 11.52V, Typical Capacity 4955mAh/ 57Wh**

**Rated Capacity 4830mAh/ 55Wh**

**Issue date: 2018/09/19**

| Approved By      | Checked By  | Prepared By     |
|------------------|-------------|-----------------|
| <i>sting sin</i> | <i>gsmh</i> | <i>Mia deng</i> |

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Form No. : W11-002-B04

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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, Section 38.3.

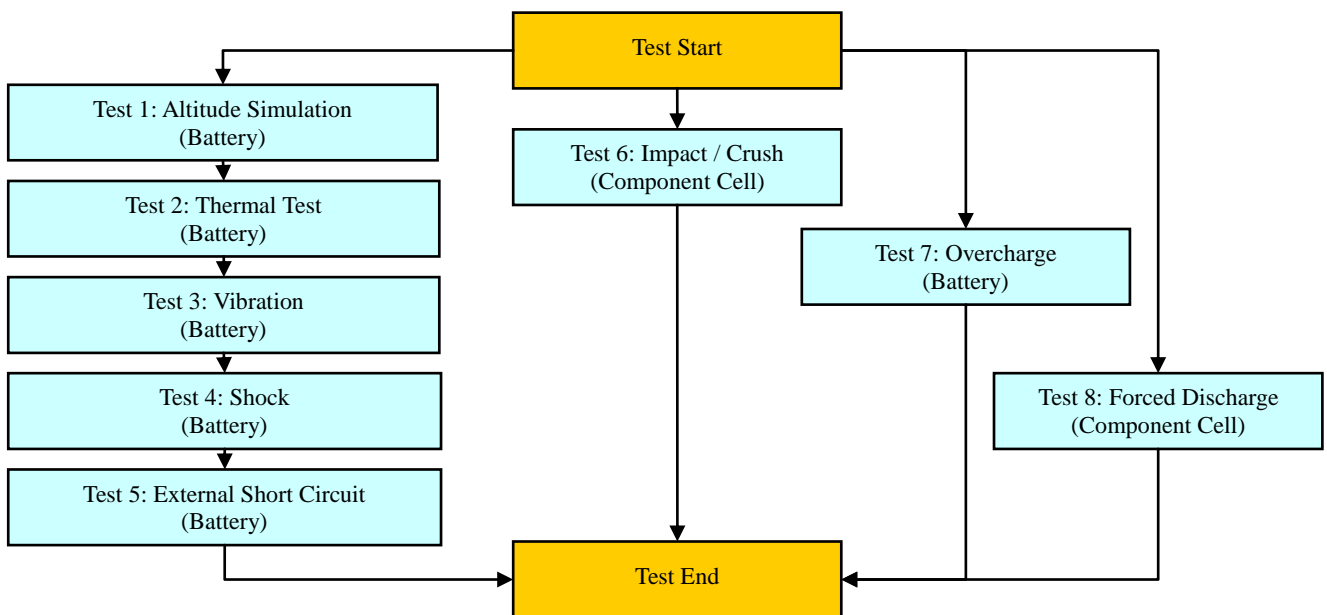
### 2. Test Quantity :

- 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.**



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Control Number: SLEU-1809005

## 5. Test Equipment :

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Revised Date: 2018-09-20

| 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          | 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              |         |
| <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              | 34401A                  | Note 1                  | Agilent      | 2018/3/1              | 2019/3/1              |         |
| V                                 | ML-494        | Electronic Balance      | XS1220M-SCS             | 1-1220 gf               | Precisa      | 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             |         |
| 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 120°C          | GF           | 2018/1/3              | 2019/1/3              |         |
| V                                 | ML-257        | Multimeter              | 34401A                  | note 1                  | Agilent      | 2018/3/1              | 2019/3/1              |         |
|                                   | ML-494        | Electronic Balance      | XS1220M-SCS             | 1-1220 gf               | Precisa      | 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<br>G:0.2~20G | King Design  | 2018/8/24             | 2019/8/24             |         |
| V                                 | ML-257        | Multimeter              | 34401A                  | note 1                  | Agilent      | 2018/3/1              | 2019/3/1              |         |
|                                   | ML-494        | Electronic Balance      | XS1220M-SCS             | 1-1220 gf               | Precisa      | 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              | 34401A                  | note 1                  | Agilent      | 2018/3/1              | 2019/3/1              |         |
|                                   | ML-494        | Electronic Balance      | XS1220M-SCS             | 1-1220 gf               | Precisa      | 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 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-457        | Data Acquisition        | XL122-D                 | 1-100 Vdc, -50 to 200°C | Yokogawa     | 2018/6/11             | 2019/6/11             |         |
|                                   | 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 200°C | Yokogawa     | 2018/9/12             | 2019/9/12             |         |

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Revised Date: 2018-09-20

| 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 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          | 2018/5/17             | 2019/5/17             |         |
|   | <b>T.8 Forced Discharge</b> |                                      |            |  |              |                       |                       |         |
|   | ML-132                      | Electronic Load                      | 3311C      | 60V,60A, 300W                                  | Prodigit     | 2018/3/1              | 2019/3/1              |         |
|   | ML-133                      | Electronic Load                      | 3311C      | 60V,60A, 300W                                  | Prodigit     | 2018/3/1              | 2019/3/1              |         |
|   | ML-136                      | Electronic Load                      | 3311C      | 60V,60A, 300W                                  | Prodigit     | 2018/3/1              | 2019/3/1              |         |
|   | ML-192                      | Electronic Load                      | 3311C      | 60V,60A, 300W                                  | Prodigit     | 2018/3/1              | 2019/3/1              |         |
|   | ML-269                      | Electronic Load                      | 3311C      | 60V,60A, 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 ℃; 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          | 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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Control Number: SLEU-1809005

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

### UN 38.3 Test Datasheet

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

|                              |                     |                                      |                                  |
|------------------------------|---------------------|--------------------------------------|----------------------------------|
| Control Number: SLEU-1809005 | Customer: Lenovo    | Model Name: L18M3PG2                 | SMP Project Name: Capela_windows |
| Pack P/N: 928QA264H (A)(B)   | Configuration: 3S1P | Test Duration: 2018/08/20~2018/09/18 | 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      | 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: 2018/09/04 09:20  | Ambient temp.: 23.5 °C |           |           |           |           | Operator: Mia |           |           |         |
| Finish time: 2018/09/04 15:40 | Sample 01              | Sample 02 | Sample 03 | Sample 04 | Sample 05 | Sample 06     | Sample 07 | Sample 08 |         |
| OCV (V)                       | Before                 | 12.733    | 12.740    | 12.741    | 12.736    | 12.739        | 12.742    | 12.731    | 12.733  |
|                               | After                  | 12.723    | 12.718    | 12.738    | 12.717    | 12.727        | 12.720    | 12.718    | 12.724  |
|                               | Residual OCV %         | 99.92%    | 99.83%    | 99.98%    | 99.85%    | 99.91%        | 99.83%    | 99.90%    | 99.93%  |
| Mass (g)                      | Before                 | 228.201   | 228.001   | 228.103   | 228.118   | 228.038       | 228.095   | 228.140   | 228.188 |
|                               | After                  | 228.201   | 228.001   | 228.101   | 228.116   | 228.037       | 228.095   | 228.140   | 228.188 |
|                               | 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: 2018/09/04 16:00  | Ambient temp.: 24.5 °C |           |           |           |           | Operator: Mia |           |           |         |
| Finish time: 2018/09/11 09:40 | Sample 01              | Sample 02 | Sample 03 | Sample 04 | Sample 05 | Sample 06     | Sample 07 | Sample 08 |         |
| OCV (V)                       | Before                 | 12.723    | 12.718    | 12.738    | 12.717    | 12.727        | 12.720    | 12.718    | 12.724  |
|                               | After                  | 12.548    | 12.556    | 12.607    | 12.562    | 12.552        | 12.543    | 12.538    | 12.541  |
|                               | Residual OCV %         | 98.62%    | 98.73%    | 98.97%    | 98.78%    | 98.62%        | 98.61%    | 98.58%    | 98.56%  |
| Mass (g)                      | Before                 | 228.201   | 228.001   | 228.101   | 228.116   | 228.037       | 228.095   | 228.140   | 228.188 |
|                               | After                  | 228.181   | 227.976   | 228.084   | 228.094   | 228.011       | 228.075   | 228.116   | 228.166 |
|                               | 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: 2018/09/11 10:00  | Ambient temp.: 23.7 °C |           |           |           |           | Operator: Mia |           |           |         |
| Finish time: 2018/09/11 11:10 | Sample 01              | Sample 02 | Sample 03 | Sample 04 | Sample 05 | Sample 06     | Sample 07 | Sample 08 |         |
| OCV (V)                       | Before                 | 12.548    | 12.556    | 12.607    | 12.562    | 12.552        | 12.543    | 12.538    | 12.541  |
|                               | After                  | 12.518    | 12.530    | 12.582    | 12.533    | 12.526        | 12.515    | 12.508    | 12.514  |
|                               | Residual OCV %         | 99.76%    | 99.79%    | 99.80%    | 99.77%    | 99.79%        | 99.78%    | 99.76%    | 99.78%  |
| Mass (g)                      | Before                 | 228.181   | 227.976   | 228.084   | 228.094   | 228.011       | 228.075   | 228.116   | 228.166 |
|                               | After                  | 228.179   | 227.976   | 228.084   | 228.091   | 228.010       | 228.075   | 228.112   | 228.164 |
|                               | 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: 2018/09/12 11:30  | Ambient temp.: 24.4 °C |           |           |           |           | Operator: Mia |           |           |         |
| Finish time: 2018/09/12 14:40 | Sample 01              | Sample 02 | Sample 03 | Sample 04 | Sample 05 | Sample 06     | Sample 07 | Sample 08 |         |
| OCV (V)                       | Before                 | 12.518    | 12.530    | 12.582    | 12.533    | 12.526        | 12.515    | 12.508    | 12.514  |
|                               | After                  | 12.507    | 12.524    | 12.572    | 12.526    | 12.523        | 12.507    | 12.496    | 12.507  |
|                               | Residual OCV %         | 99.91%    | 99.95%    | 99.92%    | 99.94%    | 99.98%        | 99.94%    | 99.90%    | 99.94%  |
| Mass (g)                      | Before                 | 228.179   | 227.976   | 228.084   | 228.091   | 228.010       | 228.075   | 228.112   | 228.164 |
|                               | After                  | 228.179   | 227.973   | 228.082   | 228.091   | 228.008       | 228.074   | 228.111   | 228.164 |
|                               | 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-1809005

**T.5 External Short Circuit**

| Start time: 2018/09/12 15:00  |        | Ambient temp.: 23.8 °C |           |           |           |           |           | Operator: Mia |           |
|-------------------------------|--------|------------------------|-----------|-----------|-----------|-----------|-----------|---------------|-----------|
| Finish time: 2018/09/13 09:00 |        | Sample 01              | Sample 02 | Sample 03 | Sample 04 | Sample 05 | Sample 06 | Sample 07     | Sample 08 |
| OCV (V)                       | Before | 12.507                 | 12.524    | 12.572    | 12.526    | 12.523    | 12.507    | 12.496        | 12.507    |
|                               | After  | 0.000                  | 0.000     | 0.000     | 0.000     | 0.000     | 0.000     | 0.000         | 0.000     |
| Resistance (<100mΩ)           |        | 58.1                   | 60.8      | 57.1      | 56.2      | 59.3      | 57.6      | 56.8          | 60.1      |
| Max Temp. (< 170°C)           |        | 57.3                   | 57.5      | 57.2      | 57.7      | 57.4      | 57.2      | 57.6          | 57.9      |
| 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: 2018/09/10 10:40  |  | Ambient temp.: 23.9 °C |            |            |            | Operator: Mia |  |
|-------------------------------|--|------------------------|------------|------------|------------|---------------|--|
| Finish time: 2018/09/11 09:00 |  | Sample 01C             | Sample 02C | Sample 03C | Sample 04C | Sample 05C    |  |
| Initial OCV (V)               |  | 3.815                  | 3.812      | 3.792      | 3.802      | 3.804         |  |
| Max Temp. (< 170°C)           |  | 23.9                   | 24.0       | 23.9       | 24.1       | 23.9          |  |
| Results                       |  | P                      | P          | P          | P          | P             |  |

**T.7 Overcharge**

| Start time: 2018/09/10 14:20  |  | Ambient temp.: 23.8 °C |           |           |           |           |           | Operator: Mia |           |
|-------------------------------|--|------------------------|-----------|-----------|-----------|-----------|-----------|---------------|-----------|
| Finish time: 2018/09/18 09:20 |  | Sample 09              | Sample 10 | Sample 11 | Sample 12 | Sample 13 | Sample 14 | Sample 15     | Sample 16 |
| Initial OCV (V)               |  | 12.731                 | 12.741    | 12.742    | 12.734    | 12.738    | 12.740    | 12.733        | 12.734    |
| Results                       |  | P                      | P         | P         | P         | P         | P         | P             | P         |

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

| Start time: 2018/09/10 10:30  |  | Ambient temp.: 23.7 °C |            |            |            |            |            |            |            | Operator: Mia |            |
|-------------------------------|--|------------------------|------------|------------|------------|------------|------------|------------|------------|---------------|------------|
| Finish time: 2018/09/18 11:10 |  | Sample 06C             | Sample 07C | Sample 08C | Sample 09C | Sample 10C | Sample 11C | Sample 12C | Sample 13C | Sample 14C    | Sample 15C |
| Initial OCV (V)               |  | 3.421                  | 3.433      | 3.462      | 3.428      | 3.450      | 3.447      | 3.455      | 3.435      | 3.460         | 3.438      |
| Results                       |  | P                      | P          | P          | P          | P          | P          | P          | P          | P             | P          |
| Sample No.                    |  | Sample 16C             | Sample 17C | Sample 18C | Sample 19C | Sample 20C | Sample 21C | Sample 22C | Sample 23C | Sample 24C    | Sample 25C |
| Initial OCV (V)               |  | 3.460                  | 3.472      | 3.414      | 3.430      | 3.458      | 3.483      | 3.443      | 3.439      | 3.451         | 3.438      |
| Results                       |  | P                      | P          | P          | P          | P          | P          | P          | P          | P             | P          |
| Sample No.                    |  | Sample 26C             | Sample 27C | Sample 28C | Sample 29C | Sample 30C | Sample 31C | Sample 32C | Sample 33C | Sample 34C    | Sample 35C |
| Initial OCV (V)               |  | 3.451                  | 3.438      | 3.466      | 3.441      |            |            |            |            |               |            |
| Results                       |  | P                      | P          | P          | P          |            |            |            |            |               |            |

**7. Test Sample:**



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