

# ***Battery Pack Test Report*** ***UN38.3***

Customer: Lenovo

Pack Model: L10C6Y12

Nominal voltage: 11.1V dc

Nominal capacity: 4400mAh/48Wh

Configuration: 3S2P

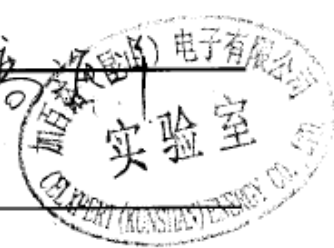
Customer P/N: 121001127

Celxpert P/N: 921300042

Cell Type: LG S3 2.2Ah

Jan. 29, 2018

Approved by \_\_\_\_\_  
Reviewed by \_\_\_\_\_



Prepared by 单礼彬

Figure photo of the pack.



# 1. UN38.3 Test Report

|             |                       |             |            |                      |       |
|-------------|-----------------------|-------------|------------|----------------------|-------|
| Test Period | 2010/11/22~2010/12/10 |             | Test Spec. | ST/SG/AC.10/11/Rev.4 |       |
| Parts Name  | Battery Pack          | Application | NB         | Quantity             | 16PCS |

## 1.1 Test Summary

| Item | Test Item                           | Test Result | Details |
|------|-------------------------------------|-------------|---------|
| T1   | Altitude simulation test (UN38.3-1) | Pass        | Page 9  |
| T2   | Thermal test (UN38.3-2)             | Pass        | Page 10 |
| T3   | Vibration test (UN38.3-3)           | Pass        | Page 11 |
| T4   | Shock test (UN38.3-4)               | Pass        | Page 12 |
| T5   | Short Circuit test (UN38.3-5)       | Pass        | Page 13 |
| T6   | Impact Test (UN38.3-6)              | Pass        | Page 13 |
| T7   | Overcharge test (UN38.3-7)          | Pass        | Page 14 |
|      |                                     |             |         |
|      |                                     |             |         |
|      |                                     |             |         |
|      |                                     |             |         |

**The battery pack passes UN38.3 test.**

**1.2 Test sample list**

| No. | Pack S/N        | Test item | No. | Cell Num.   | Test item |
|-----|-----------------|-----------|-----|-------------|-----------|
| 1   | Sample No:1/16  | 38.3.1~5  | 1   | H3634100298 | 38.3.6    |
| 2   | Sample No:2/16  | 38.3.1~5  | 2   | H3634100257 | 38.3.6    |
| 3   | Sample No:3/16  | 38.3.1~5  | 3   | H3634103196 | 38.3.6    |
| 4   | Sample No:4/16  | 38.3.1~5  | 4   | H3634100503 | 38.3.6    |
| 5   | Sample No:5/16  | 38.3.1~5  | 5   | H3634100227 | 38.3.6    |
| 6   | Sample No:6/16  | 38.3.1~5  | 6   |             |           |
| 7   | Sample No:7/16  | 38.3.1~5  | 7   |             |           |
| 8   | Sample No:8/16  | 38.3.1~5  | 8   |             |           |
| 9   | Sample No:9/16  | 38.3.7    | 9   |             |           |
| 10  | Sample No:10/16 | 38.3.7    | 10  |             |           |
| 11  | Sample No:11/16 | 38.3.7    |     |             |           |
| 12  | Sample No:12/16 | 38.3.7    |     |             |           |
| 13  | Sample No:13/16 | 38.3.7    |     |             |           |
| 14  | Sample No:14/16 | 38.3.7    |     |             |           |
| 15  | Sample No:15/16 | 38.3.7    |     |             |           |
| 16  | Sample No:16/16 | 38.3.7    |     |             |           |

**1.3 Test result**

| Item           | Test Item                      | Test specification  | Judge criteria  | Sample(s)  |            |         |                 |            |            |                |            |        |
|----------------|--------------------------------|---|---|--|------------|---------|-----------------|------------|------------|----------------|------------|--------|
| T1             | Altitude Simulation (UN38.3-1) | 1-1.4 batteries are standard charged. 4 batteries are 1C cycled 50 times, ending in fully charged state. All batteries weight is measured. The charged batteries voltage are measured and recorded.<br>1-2. Batteries shall be stored at a pressure of 11.6Kpa or less for at least six hours at ambient temperature 20+/-5 °C.<br>1-3. Vacuum is released. All cells weight is measured. The charged cell voltage are measured and recorded. | No mass loss (<0.1%), no leakage, no venting, no disassembly, no rupture and no fire.<br>Battery voltage drop < 10%.<br>Battery resistance change < ±10%. | 4 packs are standard charged (Pack#1~4)<br>4 packs 50 cycled ending in fully charged states (Pack#5~8) |            |         |                 |            |            |                |            |        |
| Test Period    |                                | Start: 2010/11/22 End: 2010/11/22   |   |  |            |         |                 |            |            |                |            |        |
| Test Equipment |                                | 數位電表 Q153, 真空烘箱 Q146, 天平 Q090   |   |  |            |         |                 |            |            |                |            |        |
| Major Problem  |                                | -   |   |  |            |         |                 |            |            |                |            |        |
| Warning Point  |                                | -   |   |  |            |         |                 |            |            |                |            |        |
| Recommendation |                                | The battery packs pass the test.  |   |  |            |         |                 |            |            |                |            |        |
| Raw Data       |                                | <b>Altitude Simulation Test on Charged Packs</b>  |   |  |            |         |                 |            |            |                |            |        |
|                |                                | No.   | Before  |  |            | After   |                 |            | Difference |                |            | Result |
|                |                                |   | OCV (V)   | Resistance (mΩ)  | Weight (g) | OCV (V) | Resistance (mΩ) | Weight (g) | Volt (%)   | Resistance (%) | Weight (%) |        |
|                |                                | 1   | 12.4886   | 233.95   | 310.04     | 12.4653 | 234.06          | 310.06     | 0.19%      | 0.05%          | 0.01%      | Pass   |
|                |                                | 2   | 12.4753   | 234.52   | 310.12     | 12.4642 | 234.62          | 310.13     | 0.09%      | 0.04%          | 0.00%      | Pass   |
|                |                                | 3   | 12.4982   | 232.85   | 310.16     | 12.4691 | 232.94          | 310.18     | 0.23%      | 0.04%          | 0.01%      | Pass   |
|                |                                | 4   | 12.4865   | 232.97   | 310.09     | 12.4687 | 233.06          | 310.10     | 0.14%      | 0.04%          | 0.00%      | Pass   |
|                |                                | 5   | 12.4892   | 233.56   | 310.15     | 12.4672 | 233.66          | 310.15     | 0.18%      | 0.04%          | 0.00%      | Pass   |
|                |                                | 6   | 12.4902   | 233.41   | 310.06     | 12.4686 | 233.48          | 310.07     | 0.17%      | 0.03%          | 0.00%      | Pass   |
|                |                                | 7   | 12.4879   | 233.60   | 310.14     | 12.4672 | 233.71          | 310.15     | 0.17%      | 0.05%          | 0.00%      | Pass   |
| 8              | 12.4823                        | 234.09  | 310.10  | 12.4655  | 234.15     | 310.11  | 0.13%           | 0.03%      | 0.00%      | Pass           |            |        |

| Item                          | Test Item               | Test specification   | Judge criteria  | Sample(s)  |                 |            |            |                |            |        |  |                               |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
|-------------------------------|-------------------------|--|---|--|-----------------|------------|------------|----------------|------------|--------|--|-------------------------------|--|--|--|--|--|--|--|--|--|--|-----|--------|--|--|-------|--|--|------------|--|--|--------|---------|-----------------|------------|---------|-----------------|------------|----------|----------------|------------|---|---------|--------|--------|---------|--------|--------|-------|-------|-------|------|---|---------|--------|--------|---------|--------|--------|-------|-------|-------|------|---|---------|--------|--------|---------|--------|--------|-------|-------|-------|------|---|---------|--------|--------|---------|--------|--------|-------|-------|-------|------|---|---------|--------|--------|---------|--------|--------|-------|-------|-------|------|---|---------|--------|--------|---------|--------|--------|-------|-------|-------|------|---|---------|--------|--------|---------|--------|--------|-------|-------|-------|------|---|---------|--------|--------|---------|--------|--------|-------|-------|-------|------|
| T2                            | Thermal test (UN38.3-2) | 2-1. Packs are stored for 6 hours at 75±2°C, followed by storage for 6 hours at -40±2°C. The maximum time interval between test temperature extremes is 30 minutes.<br>2-2.Repeat 2-1 for 10 times. Then store the packs at ambient for 24 hours. All packs weight are measured. The charged battery voltage are measured and recorded.  | No mass loss (<0.1%), no leakage, no venting, no disassembly, no rupture and no fire.<br>Battery voltage drop < 10%.<br>Battery resistance change < ±10%. | 4 packs are standard charged (Pack#1~4)<br>4 packs 50 cycled ending in fully charged states (Pack#5~8) |                 |            |            |                |            |        |  |                               |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| Test Period                   |                         | Start: 2010/11/23 End: 2010/11/30  |   |  |                 |            |            |                |            |        |  |                               |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| Test Equipment                |                         | 數位電表 Q153, 冷熱衝擊機 Q155, 天平 Q090   |   |  |                 |            |            |                |            |        |  |                               |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| Major Problem                 |                         | -  |   |  |                 |            |            |                |            |        |  |                               |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| Warning Point                 |                         | -  |   |  |                 |            |            |                |            |        |  |                               |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| Recommendation                |                         | The packs pass the test.   |   |  |                 |            |            |                |            |        |  |                               |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| Raw Data                      |                         | <table border="1"> <thead> <tr> <th colspan="11">Thermal Test on Charged Packs</th> </tr> <tr> <th rowspan="2">No.</th> <th colspan="3">Before</th> <th colspan="3">After</th> <th colspan="3">Difference</th> <th rowspan="2">Result</th> </tr> <tr> <th>OCV (V)</th> <th>Resistance (mΩ)</th> <th>Weight (g)</th> <th>OCV (V)</th> <th>Resistance (mΩ)</th> <th>Weight (g)</th> <th>Volt (%)</th> <th>Resistance (%)</th> <th>Weight (%)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>12.4653</td> <td>234.06</td> <td>310.06</td> <td>12.3856</td> <td>234.36</td> <td>310.03</td> <td>0.64%</td> <td>0.13%</td> <td>0.01%</td> <td>Pass</td> </tr> <tr> <td>2</td> <td>12.4642</td> <td>234.62</td> <td>310.13</td> <td>12.3857</td> <td>234.94</td> <td>310.12</td> <td>0.63%</td> <td>0.14%</td> <td>0.00%</td> <td>Pass</td> </tr> <tr> <td>3</td> <td>12.4691</td> <td>232.94</td> <td>310.18</td> <td>12.3869</td> <td>233.33</td> <td>310.15</td> <td>0.66%</td> <td>0.17%</td> <td>0.01%</td> <td>Pass</td> </tr> <tr> <td>4</td> <td>12.4687</td> <td>233.06</td> <td>310.10</td> <td>12.3863</td> <td>233.38</td> <td>310.08</td> <td>0.66%</td> <td>0.14%</td> <td>0.01%</td> <td>Pass</td> </tr> <tr> <td>5</td> <td>12.4672</td> <td>233.66</td> <td>310.15</td> <td>12.3859</td> <td>233.92</td> <td>310.12</td> <td>0.65%</td> <td>0.11%</td> <td>0.01%</td> <td>Pass</td> </tr> <tr> <td>6</td> <td>12.4686</td> <td>233.48</td> <td>310.07</td> <td>12.3860</td> <td>233.72</td> <td>310.05</td> <td>0.66%</td> <td>0.10%</td> <td>0.01%</td> <td>Pass</td> </tr> <tr> <td>7</td> <td>12.4672</td> <td>233.71</td> <td>310.15</td> <td>12.3858</td> <td>233.97</td> <td>310.13</td> <td>0.65%</td> <td>0.11%</td> <td>0.01%</td> <td>Pass</td> </tr> <tr> <td>8</td> <td>12.4655</td> <td>234.15</td> <td>310.11</td> <td>12.3862</td> <td>234.47</td> <td>310.09</td> <td>0.64%</td> <td>0.14%</td> <td>0.01%</td> <td>Pass</td> </tr> </tbody> </table> |   |  |                 |            |            |                |            |        |  | Thermal Test on Charged Packs |  |  |  |  |  |  |  |  |  |  | No. | Before |  |  | After |  |  | Difference |  |  | Result | OCV (V) | Resistance (mΩ) | Weight (g) | OCV (V) | Resistance (mΩ) | Weight (g) | Volt (%) | Resistance (%) | Weight (%) | 1 | 12.4653 | 234.06 | 310.06 | 12.3856 | 234.36 | 310.03 | 0.64% | 0.13% | 0.01% | Pass | 2 | 12.4642 | 234.62 | 310.13 | 12.3857 | 234.94 | 310.12 | 0.63% | 0.14% | 0.00% | Pass | 3 | 12.4691 | 232.94 | 310.18 | 12.3869 | 233.33 | 310.15 | 0.66% | 0.17% | 0.01% | Pass | 4 | 12.4687 | 233.06 | 310.10 | 12.3863 | 233.38 | 310.08 | 0.66% | 0.14% | 0.01% | Pass | 5 | 12.4672 | 233.66 | 310.15 | 12.3859 | 233.92 | 310.12 | 0.65% | 0.11% | 0.01% | Pass | 6 | 12.4686 | 233.48 | 310.07 | 12.3860 | 233.72 | 310.05 | 0.66% | 0.10% | 0.01% | Pass | 7 | 12.4672 | 233.71 | 310.15 | 12.3858 | 233.97 | 310.13 | 0.65% | 0.11% | 0.01% | Pass | 8 | 12.4655 | 234.15 | 310.11 | 12.3862 | 234.47 | 310.09 | 0.64% | 0.14% | 0.01% | Pass |
| Thermal Test on Charged Packs |                         |  |   |  |                 |            |            |                |            |        |  |                               |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| No.                           | Before                  |  |   | After  |                 |            | Difference |                |            | Result |  |                               |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
|                               | OCV (V)                 | Resistance (mΩ)  | Weight (g)  | OCV (V)  | Resistance (mΩ) | Weight (g) | Volt (%)   | Resistance (%) | Weight (%) |        |  |                               |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| 1                             | 12.4653                 | 234.06   | 310.06  | 12.3856  | 234.36          | 310.03     | 0.64%      | 0.13%          | 0.01%      | Pass   |  |                               |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| 2                             | 12.4642                 | 234.62   | 310.13  | 12.3857  | 234.94          | 310.12     | 0.63%      | 0.14%          | 0.00%      | Pass   |  |                               |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| 3                             | 12.4691                 | 232.94   | 310.18  | 12.3869  | 233.33          | 310.15     | 0.66%      | 0.17%          | 0.01%      | Pass   |  |                               |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| 4                             | 12.4687                 | 233.06   | 310.10  | 12.3863  | 233.38          | 310.08     | 0.66%      | 0.14%          | 0.01%      | Pass   |  |                               |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| 5                             | 12.4672                 | 233.66   | 310.15  | 12.3859  | 233.92          | 310.12     | 0.65%      | 0.11%          | 0.01%      | Pass   |  |                               |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| 6                             | 12.4686                 | 233.48   | 310.07  | 12.3860  | 233.72          | 310.05     | 0.66%      | 0.10%          | 0.01%      | Pass   |  |                               |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| 7                             | 12.4672                 | 233.71   | 310.15  | 12.3858  | 233.97          | 310.13     | 0.65%      | 0.11%          | 0.01%      | Pass   |  |                               |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| 8                             | 12.4655                 | 234.15   | 310.11  | 12.3862  | 234.47          | 310.09     | 0.64%      | 0.14%          | 0.01%      | Pass   |  |                               |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |

| Item                            | Test Item                 | Test specification   | Judge criteria   | Sample(s)  |                 |            |            |                |            |        |  |                                 |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
|---------------------------------|---------------------------|--|--|--|-----------------|------------|------------|----------------|------------|--------|--|---------------------------------|--|--|--|--|--|--|--|--|--|--|-----|--------|--|--|-------|--|--|------------|--|--|--------|---------|-----------------|------------|---------|-----------------|------------|----------|----------------|------------|---|---------|--------|--------|---------|--------|--------|-------|-------|-------|------|---|---------|--------|--------|---------|--------|--------|-------|-------|-------|------|---|---------|--------|--------|---------|--------|--------|-------|-------|-------|------|---|---------|--------|--------|---------|--------|--------|-------|-------|-------|------|---|---------|--------|--------|---------|--------|--------|-------|-------|-------|------|---|---------|--------|--------|---------|--------|--------|-------|-------|-------|------|---|---------|--------|--------|---------|--------|--------|-------|-------|-------|------|---|---------|--------|--------|---------|--------|--------|-------|-------|-------|------|
| T3                              | Vibration test (UN38.3-3) | 3-1. Packs are firmly secured to the platform of the vibration machine without distorting the packs in such a manner as to faithfully transmit the vibration. The vibration shall be a sinusoidal waveform with a logarithmic sweep between 7 and 200 Hz and back to 7 Hz traversed in 15 minutes. This cycle shall be repeated 12 times for a total of 3 hours for each of 3 mutually perpendicular to the terminal face.<br>3-2. The logarithmic frequency sweep is as follows:<br>7-18 Hz → 1gn<br>18-50 Hz → 0.8mm amplitude<br>50-200 Hz → 8gn<br>3-3. All packs weight are measured. The charged packs voltage are measured and recorded.  | No mass loss (<0.1%), no leakage, no venting, no disassembly, no rupture and no fire.<br>Battery voltage drop < 10%.<br>Battery resistance change < ±10% | 4 packs are standard charged (Pack#1~4)<br>4 packs 50 cycled ending in fully charged states (Pack#5~8) |                 |            |            |                |            |        |  |                                 |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| Test Period                     |                           | Start: 2010/12/1 End: 2010 /12/2   |  |  |                 |            |            |                |            |        |  |                                 |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| Test Equipment                  |                           | 數位電表 Q153, 振動測試機 Q300, 天平 Q090   |  |  |                 |            |            |                |            |        |  |                                 |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| Major Problem                   |                           | -  |  |  |                 |            |            |                |            |        |  |                                 |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| Warning Point                   |                           | -  |  |  |                 |            |            |                |            |        |  |                                 |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| Recommendation                  |                           | The packs pass the test.   |  |  |                 |            |            |                |            |        |  |                                 |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| Raw Data                        |                           | <table border="1"> <thead> <tr> <th colspan="11">Vibration Test on Charged Packs</th> </tr> <tr> <th rowspan="2">No.</th> <th colspan="3">Before</th> <th colspan="3">After</th> <th colspan="3">Difference</th> <th rowspan="2">Result</th> </tr> <tr> <th>OCV (V)</th> <th>Resistance (mΩ)</th> <th>Weight (g)</th> <th>OCV (V)</th> <th>Resistance (mΩ)</th> <th>Weight (g)</th> <th>Volt (%)</th> <th>Resistance (%)</th> <th>Weight (%)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>12.3856</td> <td>234.36</td> <td>310.03</td> <td>12.3659</td> <td>234.51</td> <td>310.04</td> <td>0.16%</td> <td>0.06%</td> <td>0.00%</td> <td>Pass</td> </tr> <tr> <td>2</td> <td>12.3857</td> <td>234.94</td> <td>310.12</td> <td>12.3648</td> <td>235.02</td> <td>310.13</td> <td>0.17%</td> <td>0.03%</td> <td>0.00%</td> <td>Pass</td> </tr> <tr> <td>3</td> <td>12.3869</td> <td>233.33</td> <td>310.15</td> <td>12.3660</td> <td>233.34</td> <td>310.15</td> <td>0.17%</td> <td>0.00%</td> <td>0.00%</td> <td>Pass</td> </tr> <tr> <td>4</td> <td>12.3863</td> <td>233.38</td> <td>310.08</td> <td>12.3644</td> <td>233.41</td> <td>310.09</td> <td>0.18%</td> <td>0.01%</td> <td>0.00%</td> <td>Pass</td> </tr> <tr> <td>5</td> <td>12.3859</td> <td>233.92</td> <td>310.12</td> <td>12.3652</td> <td>234.05</td> <td>310.12</td> <td>0.17%</td> <td>0.06%</td> <td>0.00%</td> <td>Pass</td> </tr> <tr> <td>6</td> <td>12.3860</td> <td>233.72</td> <td>310.05</td> <td>12.3648</td> <td>233.92</td> <td>310.05</td> <td>0.17%</td> <td>0.09%</td> <td>0.00%</td> <td>Pass</td> </tr> <tr> <td>7</td> <td>12.3858</td> <td>233.97</td> <td>310.13</td> <td>12.3652</td> <td>234.08</td> <td>310.13</td> <td>0.17%</td> <td>0.05%</td> <td>0.00%</td> <td>Pass</td> </tr> <tr> <td>8</td> <td>12.3862</td> <td>234.47</td> <td>310.09</td> <td>12.3655</td> <td>234.62</td> <td>310.10</td> <td>0.17%</td> <td>0.06%</td> <td>0.00%</td> <td>Pass</td> </tr> </tbody> </table> |  |  |                 |            |            |                |            |        |  | Vibration Test on Charged Packs |  |  |  |  |  |  |  |  |  |  | No. | Before |  |  | After |  |  | Difference |  |  | Result | OCV (V) | Resistance (mΩ) | Weight (g) | OCV (V) | Resistance (mΩ) | Weight (g) | Volt (%) | Resistance (%) | Weight (%) | 1 | 12.3856 | 234.36 | 310.03 | 12.3659 | 234.51 | 310.04 | 0.16% | 0.06% | 0.00% | Pass | 2 | 12.3857 | 234.94 | 310.12 | 12.3648 | 235.02 | 310.13 | 0.17% | 0.03% | 0.00% | Pass | 3 | 12.3869 | 233.33 | 310.15 | 12.3660 | 233.34 | 310.15 | 0.17% | 0.00% | 0.00% | Pass | 4 | 12.3863 | 233.38 | 310.08 | 12.3644 | 233.41 | 310.09 | 0.18% | 0.01% | 0.00% | Pass | 5 | 12.3859 | 233.92 | 310.12 | 12.3652 | 234.05 | 310.12 | 0.17% | 0.06% | 0.00% | Pass | 6 | 12.3860 | 233.72 | 310.05 | 12.3648 | 233.92 | 310.05 | 0.17% | 0.09% | 0.00% | Pass | 7 | 12.3858 | 233.97 | 310.13 | 12.3652 | 234.08 | 310.13 | 0.17% | 0.05% | 0.00% | Pass | 8 | 12.3862 | 234.47 | 310.09 | 12.3655 | 234.62 | 310.10 | 0.17% | 0.06% | 0.00% | Pass |
| Vibration Test on Charged Packs |                           |  |  |  |                 |            |            |                |            |        |  |                                 |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| No.                             | Before                    |  |  | After  |                 |            | Difference |                |            | Result |  |                                 |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
|                                 | OCV (V)                   | Resistance (mΩ)  | Weight (g)   | OCV (V)  | Resistance (mΩ) | Weight (g) | Volt (%)   | Resistance (%) | Weight (%) |        |  |                                 |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| 1                               | 12.3856                   | 234.36   | 310.03   | 12.3659  | 234.51          | 310.04     | 0.16%      | 0.06%          | 0.00%      | Pass   |  |                                 |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| 2                               | 12.3857                   | 234.94   | 310.12   | 12.3648  | 235.02          | 310.13     | 0.17%      | 0.03%          | 0.00%      | Pass   |  |                                 |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| 3                               | 12.3869                   | 233.33   | 310.15   | 12.3660  | 233.34          | 310.15     | 0.17%      | 0.00%          | 0.00%      | Pass   |  |                                 |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| 4                               | 12.3863                   | 233.38   | 310.08   | 12.3644  | 233.41          | 310.09     | 0.18%      | 0.01%          | 0.00%      | Pass   |  |                                 |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| 5                               | 12.3859                   | 233.92   | 310.12   | 12.3652  | 234.05          | 310.12     | 0.17%      | 0.06%          | 0.00%      | Pass   |  |                                 |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| 6                               | 12.3860                   | 233.72   | 310.05   | 12.3648  | 233.92          | 310.05     | 0.17%      | 0.09%          | 0.00%      | Pass   |  |                                 |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| 7                               | 12.3858                   | 233.97   | 310.13   | 12.3652  | 234.08          | 310.13     | 0.17%      | 0.05%          | 0.00%      | Pass   |  |                                 |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| 8                               | 12.3862                   | 234.47   | 310.09   | 12.3655  | 234.62          | 310.10     | 0.17%      | 0.06%          | 0.00%      | Pass   |  |                                 |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |

| Item                        | Test Item             | Test specification   | Judge criteria  | Sample(s)  |                 |            |            |                |            |        |  |                             |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
|-----------------------------|-----------------------|--|---|--|-----------------|------------|------------|----------------|------------|--------|--|-----------------------------|--|--|--|--|--|--|--|--|--|--|-----|--------|--|--|-------|--|--|------------|--|--|--------|---------|-----------------|------------|---------|-----------------|------------|----------|----------------|------------|---|---------|--------|--------|---------|--------|--------|-------|-------|-------|------|---|---------|--------|--------|---------|--------|--------|-------|-------|-------|------|---|---------|--------|--------|---------|--------|--------|-------|-------|-------|------|---|---------|--------|--------|---------|--------|--------|-------|-------|-------|------|---|---------|--------|--------|---------|--------|--------|-------|-------|-------|------|---|---------|--------|--------|---------|--------|--------|-------|-------|-------|------|---|---------|--------|--------|---------|--------|--------|-------|-------|-------|------|---|---------|--------|--------|---------|--------|--------|-------|-------|-------|------|
| T4                          | Shock test (UN38.3-4) | 4-1. Packs shall be secured to the testing machine by means of a rigid mount, which will support all mounting surfaces.<br>4-2. Packs shall be subjected to a half-sine shock of peak acceleration 150gn and pulse duration of 6 milliseconds. Each pack shall be subjected to 3 shocks in the positive direction followed by three shocks in the negative direction of three mutually perpendicularly mounting positions of the pack for a total of 18 shocks.<br>4-3. All batteries weight are measured. The charged cell voltage are measured and recorded.   | No mass loss (<0.1%), no leakage, no venting, no disassembly, no rupture and no fire.<br>Battery voltage drop < 10%.<br>Battery resistance change < ±10%. | 4 packs are standard charged (Pack#1~4)<br>4 packs 50 cycled ending in fully charged states (Pack#5~8) |                 |            |            |                |            |        |  |                             |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| Test Period                 |                       | Start: 2010/12/3 End: 2010 /12/3   |   |  |                 |            |            |                |            |        |  |                             |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| Test Equipment              |                       | 數位電表 Q153, 衝擊測試機 Q154, 天平 Q090   |   |  |                 |            |            |                |            |        |  |                             |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| Major Problem               |                       | -  |   |  |                 |            |            |                |            |        |  |                             |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| Warning Point               |                       | -  |   |  |                 |            |            |                |            |        |  |                             |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| Recommendation              |                       | The packs pass the test.   |   |  |                 |            |            |                |            |        |  |                             |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| Raw Data                    |                       | <table border="1"> <thead> <tr> <th colspan="11">Shock Test on Charged Packs</th> </tr> <tr> <th rowspan="2">No.</th> <th colspan="3">Before</th> <th colspan="3">After</th> <th colspan="3">Difference</th> <th rowspan="2">Result</th> </tr> <tr> <th>OCV (V)</th> <th>Resistance (mΩ)</th> <th>Weight (g)</th> <th>OCV (V)</th> <th>Resistance (mΩ)</th> <th>Weight (g)</th> <th>Volt (%)</th> <th>Resistance (%)</th> <th>Weight (%)</th> </tr> </thead> <tbody> <tr><td>1</td><td>12.3659</td><td>234.51</td><td>310.04</td><td>12.3506</td><td>234.61</td><td>310.04</td><td>0.12%</td><td>0.04%</td><td>0.00%</td><td>Pass</td></tr> <tr><td>2</td><td>12.3648</td><td>235.02</td><td>310.13</td><td>12.3511</td><td>234.36</td><td>310.13</td><td>0.11%</td><td>0.28%</td><td>0.00%</td><td>Pass</td></tr> <tr><td>3</td><td>12.3660</td><td>233.34</td><td>310.15</td><td>12.3518</td><td>233.62</td><td>310.16</td><td>0.11%</td><td>0.12%</td><td>0.00%</td><td>Pass</td></tr> <tr><td>4</td><td>12.3644</td><td>233.41</td><td>310.09</td><td>12.3496</td><td>233.53</td><td>310.09</td><td>0.12%</td><td>0.05%</td><td>0.00%</td><td>Pass</td></tr> <tr><td>5</td><td>12.3652</td><td>234.05</td><td>310.12</td><td>12.3526</td><td>234.12</td><td>310.14</td><td>0.10%</td><td>0.03%</td><td>0.01%</td><td>Pass</td></tr> <tr><td>6</td><td>12.3648</td><td>233.92</td><td>310.05</td><td>12.3513</td><td>234.06</td><td>310.05</td><td>0.11%</td><td>0.06%</td><td>0.00%</td><td>Pass</td></tr> <tr><td>7</td><td>12.3652</td><td>234.08</td><td>310.13</td><td>12.3520</td><td>233.89</td><td>310.14</td><td>0.11%</td><td>0.08%</td><td>0.00%</td><td>Pass</td></tr> <tr><td>8</td><td>12.3655</td><td>234.62</td><td>310.10</td><td>12.3515</td><td>234.52</td><td>310.10</td><td>0.11%</td><td>0.04%</td><td>0.00%</td><td>Pass</td></tr> </tbody> </table> |   |  |                 |            |            |                |            |        |  | Shock Test on Charged Packs |  |  |  |  |  |  |  |  |  |  | No. | Before |  |  | After |  |  | Difference |  |  | Result | OCV (V) | Resistance (mΩ) | Weight (g) | OCV (V) | Resistance (mΩ) | Weight (g) | Volt (%) | Resistance (%) | Weight (%) | 1 | 12.3659 | 234.51 | 310.04 | 12.3506 | 234.61 | 310.04 | 0.12% | 0.04% | 0.00% | Pass | 2 | 12.3648 | 235.02 | 310.13 | 12.3511 | 234.36 | 310.13 | 0.11% | 0.28% | 0.00% | Pass | 3 | 12.3660 | 233.34 | 310.15 | 12.3518 | 233.62 | 310.16 | 0.11% | 0.12% | 0.00% | Pass | 4 | 12.3644 | 233.41 | 310.09 | 12.3496 | 233.53 | 310.09 | 0.12% | 0.05% | 0.00% | Pass | 5 | 12.3652 | 234.05 | 310.12 | 12.3526 | 234.12 | 310.14 | 0.10% | 0.03% | 0.01% | Pass | 6 | 12.3648 | 233.92 | 310.05 | 12.3513 | 234.06 | 310.05 | 0.11% | 0.06% | 0.00% | Pass | 7 | 12.3652 | 234.08 | 310.13 | 12.3520 | 233.89 | 310.14 | 0.11% | 0.08% | 0.00% | Pass | 8 | 12.3655 | 234.62 | 310.10 | 12.3515 | 234.52 | 310.10 | 0.11% | 0.04% | 0.00% | Pass |
| Shock Test on Charged Packs |                       |  |   |  |                 |            |            |                |            |        |  |                             |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| No.                         | Before                |  |   | After  |                 |            | Difference |                |            | Result |  |                             |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
|                             | OCV (V)               | Resistance (mΩ)  | Weight (g)  | OCV (V)  | Resistance (mΩ) | Weight (g) | Volt (%)   | Resistance (%) | Weight (%) |        |  |                             |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| 1                           | 12.3659               | 234.51   | 310.04  | 12.3506  | 234.61          | 310.04     | 0.12%      | 0.04%          | 0.00%      | Pass   |  |                             |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| 2                           | 12.3648               | 235.02   | 310.13  | 12.3511  | 234.36          | 310.13     | 0.11%      | 0.28%          | 0.00%      | Pass   |  |                             |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| 3                           | 12.3660               | 233.34   | 310.15  | 12.3518  | 233.62          | 310.16     | 0.11%      | 0.12%          | 0.00%      | Pass   |  |                             |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| 4                           | 12.3644               | 233.41   | 310.09  | 12.3496  | 233.53          | 310.09     | 0.12%      | 0.05%          | 0.00%      | Pass   |  |                             |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| 5                           | 12.3652               | 234.05   | 310.12  | 12.3526  | 234.12          | 310.14     | 0.10%      | 0.03%          | 0.01%      | Pass   |  |                             |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| 6                           | 12.3648               | 233.92   | 310.05  | 12.3513  | 234.06          | 310.05     | 0.11%      | 0.06%          | 0.00%      | Pass   |  |                             |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| 7                           | 12.3652               | 234.08   | 310.13  | 12.3520  | 233.89          | 310.14     | 0.11%      | 0.08%          | 0.00%      | Pass   |  |                             |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |
| 8                           | 12.3655               | 234.62   | 310.10  | 12.3515  | 234.52          | 310.10     | 0.11%      | 0.04%          | 0.00%      | Pass   |  |                             |  |  |  |  |  |  |  |  |  |  |     |        |  |  |       |  |  |            |  |  |        |         |                 |            |         |                 |            |          |                |            |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |   |         |        |        |         |        |        |       |       |       |      |



| Item                                | Test Item                     | Test specification  | Judge criteria   | Sample(s)  |                                     |  |  |  |     |                |        |        |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |
|-------------------------------------|-------------------------------|---|--|--|-------------------------------------|--|--|--|-----|----------------|--------|--------|---|-------|----|------|---|-------|----|------|---|-------|----|------|---|-------|----|------|---|-------|----|------|---|-------|----|------|---|-------|----|------|---|-------|----|------|
| T5                                  | Short Circuit Test (UN38.3-5) | 5-1.Packs are placed in to a 55±2°C oven, and exterior packs temperature are monitored<br>5-2.When packs exterior reach 55±2°C, they are shorted by connecting terminals with a copper wire of resistance less than 100m Ohm.<br>5-4. The short was continued for more than 1hour or the cell temperature return to 55°C. The packs are observed for a further 6 hours.   | No rupture, no disassembly, no explosion, no fire, no smoke. Packs exterior peak temperature <170°C.                   | 4 packs are standard charged (Pack#1~4)<br>4 packs 50 cycled ending in fully charged states (Pack#5~8) |                                     |  |  |  |     |                |        |        |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |
| Test Period                         |                               | Start: 2010/12/4 End: 2010/12/5   |  |  |                                     |  |  |  |     |                |        |        |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |
| Test Equipment                      |                               | 數位電表 Q153, 資料收集器 Q078, 烘箱 Q171  |  |  |                                     |  |  |  |     |                |        |        |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |
| Recommendation                      |                               | The packs pass the test.  |  |  |                                     |  |  |  |     |                |        |        |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |
| Raw Data                            |                               | <table border="1"> <thead> <tr> <th colspan="4">Short Circuit Test on Charged Packs</th> </tr> <tr> <th>No.</th> <th>Max. Temp.(°C)</th> <th>Visual</th> <th>Result</th> </tr> </thead> <tbody> <tr><td>1</td><td>55.68</td><td>OK</td><td>Pass</td></tr> <tr><td>2</td><td>55.78</td><td>OK</td><td>Pass</td></tr> <tr><td>3</td><td>55.82</td><td>OK</td><td>Pass</td></tr> <tr><td>4</td><td>55.90</td><td>OK</td><td>Pass</td></tr> <tr><td>5</td><td>56.12</td><td>OK</td><td>Pass</td></tr> <tr><td>6</td><td>55.97</td><td>OK</td><td>Pass</td></tr> <tr><td>7</td><td>56.07</td><td>OK</td><td>Pass</td></tr> <tr><td>8</td><td>55.93</td><td>OK</td><td>Pass</td></tr> </tbody> </table> |  |  | Short Circuit Test on Charged Packs |  |  |  | No. | Max. Temp.(°C) | Visual | Result | 1 | 55.68 | OK | Pass | 2 | 55.78 | OK | Pass | 3 | 55.82 | OK | Pass | 4 | 55.90 | OK | Pass | 5 | 56.12 | OK | Pass | 6 | 55.97 | OK | Pass | 7 | 56.07 | OK | Pass | 8 | 55.93 | OK | Pass |
| Short Circuit Test on Charged Packs |                               |   |  |  |                                     |  |  |  |     |                |        |        |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |
| No.                                 | Max. Temp.(°C)                | Visual  | Result   |  |                                     |  |  |  |     |                |        |        |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |
| 1                                   | 55.68                         | OK  | Pass   |  |                                     |  |  |  |     |                |        |        |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |
| 2                                   | 55.78                         | OK  | Pass   |  |                                     |  |  |  |     |                |        |        |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |
| 3                                   | 55.82                         | OK  | Pass   |  |                                     |  |  |  |     |                |        |        |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |
| 4                                   | 55.90                         | OK  | Pass   |  |                                     |  |  |  |     |                |        |        |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |
| 5                                   | 56.12                         | OK  | Pass   |  |                                     |  |  |  |     |                |        |        |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |
| 6                                   | 55.97                         | OK  | Pass   |  |                                     |  |  |  |     |                |        |        |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |
| 7                                   | 56.07                         | OK  | Pass   |  |                                     |  |  |  |     |                |        |        |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |
| 8                                   | 55.93                         | OK  | Pass   |  |                                     |  |  |  |     |                |        |        |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |
| Item                                | Test Item                     | Test specification  | Judge criteria   | Sample(s)  |                                     |  |  |  |     |                |        |        |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |
| T6                                  | Impact test (UN38.3-6)        | 6-1. The test sample is to be placed on a flat surface. A 15.8mm diameter bar is to be placed across the center of the sample. A 9.1 Kg mass is to be dropped from a height of 61±2.5cm onto the sample.<br>6-2. A cylindrical or prismatic cell is to be impacted with its longitudinal axis parallel to the flat surface.   | External temperature of cell does not exceed 170°C and there is no disassembly and no fire within 6 hours of the test. | 5 cells are 50% charged (Cell #1~5)<br>For prismatic cell, The amount double                           |                                     |  |  |  |     |                |        |        |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |
| Test Period                         |                               | Start: 2010/11/26 End: 2010/11/27   |  |  |                                     |  |  |  |     |                |        |        |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |
| Test Equipment                      |                               | 數位電表 Q153, 資料收集器 Q160, 撞擊試驗機 Q231   |  |  |                                     |  |  |  |     |                |        |        |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |
| Recommendation                      |                               | The Cells pass the test.  |  |  |                                     |  |  |  |     |                |        |        |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |
| Raw Data                            |                               | <table border="1"> <thead> <tr> <th colspan="4">Impact Test on 50% Charged Cells</th> </tr> <tr> <th>No.</th> <th>Max. Temp.(°C)</th> <th>Visual</th> <th>Result</th> </tr> </thead> <tbody> <tr><td>1</td><td>31.52</td><td>OK</td><td>Pass</td></tr> <tr><td>2</td><td>29.66</td><td>OK</td><td>Pass</td></tr> <tr><td>3</td><td>30.15</td><td>OK</td><td>Pass</td></tr> <tr><td>4</td><td>28.23</td><td>OK</td><td>Pass</td></tr> <tr><td>5</td><td>29.81</td><td>OK</td><td>Pass</td></tr> </tbody> </table>  |  |  | Impact Test on 50% Charged Cells    |  |  |  | No. | Max. Temp.(°C) | Visual | Result | 1 | 31.52 | OK | Pass | 2 | 29.66 | OK | Pass | 3 | 30.15 | OK | Pass | 4 | 28.23 | OK | Pass | 5 | 29.81 | OK | Pass |   |       |    |      |   |       |    |      |   |       |    |      |
| Impact Test on 50% Charged Cells    |                               |   |  |  |                                     |  |  |  |     |                |        |        |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |
| No.                                 | Max. Temp.(°C)                | Visual  | Result   |  |                                     |  |  |  |     |                |        |        |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |
| 1                                   | 31.52                         | OK  | Pass   |  |                                     |  |  |  |     |                |        |        |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |
| 2                                   | 29.66                         | OK  | Pass   |  |                                     |  |  |  |     |                |        |        |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |
| 3                                   | 30.15                         | OK  | Pass   |  |                                     |  |  |  |     |                |        |        |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |
| 4                                   | 28.23                         | OK  | Pass   |  |                                     |  |  |  |     |                |        |        |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |
| 5                                   | 29.81                         | OK  | Pass   |  |                                     |  |  |  |     |                |        |        |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |   |       |    |      |

| Item           | Test Item                               | Test specification  | Judge criteria   | Sample(s)  |        |        |
|----------------|---|---|--|--|--------|--------|
| T7             | Overcharge test (UN38.3-7)              | 7-1. The charge current shall be twice the Spec's recommended maximum continuous charge current.<br>7-2. The minimum voltage of the test shall be as follows:<br>(a) When the Spec's recommended charge voltage is not more than 18V, the minimum voltage of the test shall be the lesser of two times the maximum charge voltage of the battery or 22V.<br>(b) When the Spec's recommended charge voltage is more than 18V, the minimum voltage of the test shall be 1.2 times the maximum charge voltage.<br>7-3. Tests are to be conducted at ambient temperature. The duration of the test shall be 24 hours. | No disassembly, no fire within seven days of the test. | 4 packs are fully charged (Pack#9~12)<br>4 packs are 50 times cycled ending in fully charged state (Pack #13~16) |        |        |
| Test Period    |   | Start: 2010/12/3 End: 2010/12/10  |  |  |        |        |
| Test Equipment |   | 數位電表 Q153, 資料收集器 Q151, 電源供應器 Q147   |  |  |        |        |
| Major Problem  |   | -   |  |  |        |        |
| Warning Point  |   | -   |  |  |        |        |
| Recommendation |   | The packs pass the test.  |  |  |        |        |
| Raw Data       | <b>Overcharge Test on Charged Packs</b> |   |  |  |        |        |
|                | No.                                     | Charge Voltage(V)   | Charge Current(A)                                      | Max. Temp.(°C)   | Visual | Result |
|                | 9                                       | 22.0 V  | 4.4 A  | 25.48  | OK     | Pass   |
|                | 10                                      |   |  | 25.34  | OK     | Pass   |
|                | 11                                      |   |  | 25.13  | OK     | Pass   |
|                | 12                                      |   |  | 24.86  | OK     | Pass   |
|                | 13                                      |   |  | 25.06  | OK     | Pass   |
|                | 14                                      |   |  | 25.13  | OK     | Pass   |
|                | 15                                      |   |  | 24.97  | OK     | Pass   |
|                | 16                                      |   |  | 24.87  | OK     | Pass   |