

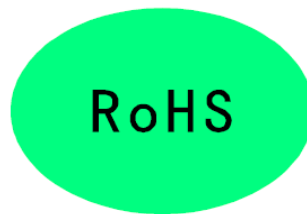


SCUD (Fujian) Electronics Co., Ltd.

File No.

SLG170915061

Battery Specification



| | |
|----------------|--------------------------|
| Battery Model | C11P1707 |
| customer | ASUS |
| Cell Model | ATL-456080L |
| Customer's PN | 0B200-02880000 |
| SCUD's Model | C11P1707-SR |
| Pack type | 1S1P Li-ion Battery Pack |
| Version / Date | V0.11/2017-10-09 |

| | | | |
|------|------------|------------|------------|
| | Draft | Check | Approve |
| Name | 孙孟洪 | 陈成 | 王维乐 |
| Date | 2017.10.09 | 2017.10.09 | 2017.10.09 |



Revision History

[illegible]



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1. General

1.1. Scope

The specification describes the requirements for Musca Li-Ion battery pack.

Battery supplied by SCUD (Fujian) Electronics Co., Ltd.

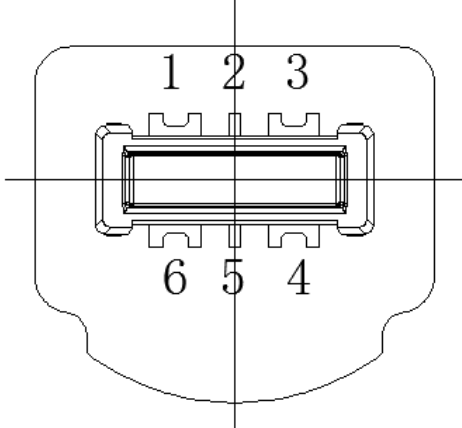
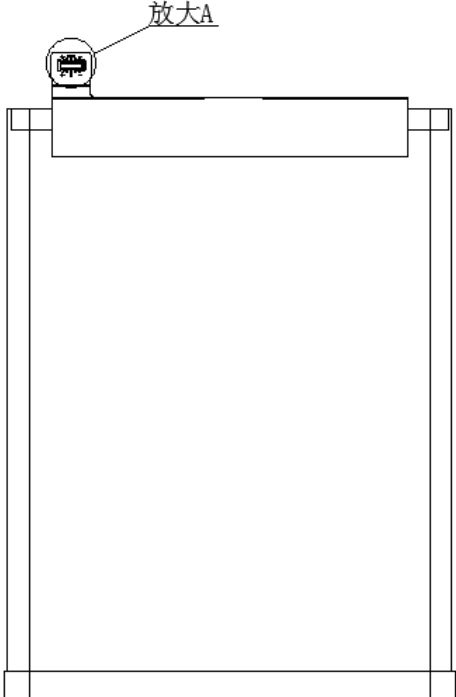
1.2. Composition

| | |
|----------------------|---------------------------------------|
| Applied Product Name | Rechargeable lithium-ion battery pack |
| PN NO. | 0B200-02880000 |
| Model Name | C11P1707 |
| Cell Type | ATL456080L |
| Cell Capacity | 4000mAh |
| Pack Design Capacity | 4000mAh |
| Pack Configuration | 1Series 1Parallel(1S1P) |
| BMU solution | R5486K519CM |

1.3. Pin Assignment

| | |
|----------------|---|
| Pin Assignment | <p>PIN 1: Pack+</p> <p>PIN 2: TH (Temperature detect)</p> <p>PIN 3: Pack-</p> <p>PIN 4: Pack-</p> <p>PIN 5: ID (Connect 100kohm to Pack-)</p> <p>PIN 6: Pack+</p> |
|----------------|---|

放大A



A 处放大10倍

Connector: panasonic AXF463500 6pin



2. Product Specification

2.1. Electrical Specification

| No. | Item | | Specification | Remark |
|----------|---------------------------|--------------------|---|---|
| 2. 1. 1 | Capacity | Min. | 3820mAh | Charge:0.2C to 4.4V,cut off 0.02C Discharge:0.2C to 3.0V, at $25 \pm 2^{\circ}\text{C}$,rest 10 min. |
| | | Typ. | 4000mAh | |
| 2. 1. 2 | Normal voltage | | 3.85V | - |
| 2. 1. 3 | End of charge voltage | | 4.4V | CC/CV mode |
| 2. 1. 4 | Discharge cut off voltage | | 3.0V | - |
| 2. 1. 5 | Pack shipping OCV | | 3.71~3.795V | Measure cells at $25 \pm 3^{\circ}\text{C}$, About 15~30% SOC. |
| 2. 1. 6 | charge | Rate | 0.3C to 4.4V,cut off 0.02C | 0~10 $^{\circ}\text{C}$ |
| | | | 0.5C to 4.4V,cut off 0.02C | 10~20 $^{\circ}\text{C}$ |
| | | | 0.5C to 4.4V,cut off 0.02C | 20~50 $^{\circ}\text{C}$ |
| | | | 0.5C to 4.1V,cut off 0.02C | 50~60 $^{\circ}\text{C}$ |
| 2. 1. 7 | Discharge current | Standard | 0.2C | Cut off 3.0V,at -20~60 $^{\circ}\text{C}$ |
| | | Maximum Continuous | 10.8W(CP) | At 40 $^{\circ}\text{C}$,from full to 3.0V |
| | | | 3.6A | |
| | | Peak | 6.2A | 2s |
| 2. 1. 8 | Battery impedance | | $\leq 120\text{m}\Omega$ | 1kHz,as shipping OCV |
| 2. 1. 9 | Operating temperature | Charge | 0 $^{\circ}\text{C}$ ~45 $^{\circ}\text{C}$ | Humidity:Less than 85% RH |
| | | Discharge | -20 $^{\circ}\text{C}$ ~60 $^{\circ}\text{C}$ | |
| 2. 1. 10 | Storage temperature range | ≤ 3 month | -20 $^{\circ}\text{C}$ ~45 $^{\circ}\text{C}$ | Humidity:45%~ 85% RH Storage voltage shall be 3.6V to 3.95V. |
| | | ≥ 3 month | $25 \pm 3^{\circ}\text{C}$ | |
| 2. 1. 11 | Weight | TBD | - | - |

2.2. Charge State before Shipment

Shipment of battery voltage 3.73~3.795V (20%-30%).



2.3. Protection Specification

| No. | Item | | Unit | Min. | Typ. | Max | Remarks |
|----------|--|--------------|------|----------------------|-------|-------|-----------|
| 2. 3. 1 | Operating input voltage | | V | 1.5 | - | 5.0 | - |
| 2. 3. 2 | Overcharge protection voltage | | V | 4.455 | 4.475 | 4.495 | 25℃ |
| | | | V | 4.450 | 4.475 | 4.500 | -20~+60℃ |
| 2. 3. 3 | Overcharge protection delay time | | s | 0.7 | 1.0 | 1.3 | 25℃ |
| | | | s | 0.67 | 1.0 | 1.48 | -20~+60℃ |
| 2. 3. 4 | Over charge protection release | | V | 4.445 | 4.475 | 4.495 | 25℃ |
| | | | V | 4.425 | 4.475 | 4.500 | -20~+60℃ |
| | | | - | Or discharge release | | | - |
| 2. 3. 5 | Over discharge protection voltage | | V | 2.365 | 2.40 | 2.435 | 25℃ |
| | | | V | 2.360 | 2.40 | 2.440 | -20~+60℃ |
| 2. 3. 6 | Overdischarge protection delay time | | ms | 14 | 20 | 26 | 25℃ |
| | | | ms | 13.1 | 20 | 30 | -20~+60℃ |
| 2. 3. 7 | Over discharge protection release | | V | 2.365 | 2.40 | 2.465 | 25℃ |
| | | | V | 2.360 | 2.40 | 2.470 | -20~+60℃ |
| | | | - | Or charge release | | | - |
| 2. 3. 8 | Charge over current protection | | A | 4.1 | 5 | 5.8 | 25℃ |
| | | | A | 4.0 | 5 | 5.9 | -20~+60℃ |
| 2. 3. 9 | Charge over current protection delay time | | ms | 11 | 16 | 21 | 25℃ |
| | | | ms | 10.7 | 16 | 23.6 | -20~+60℃ |
| 2. 3. 10 | Charge over current protection release | | - | discharge release | | | - |
| 2. 3. 11 | Discharge over current protection | | A | 7.2 | 8 | 8.8 | 25℃ |
| | | | A | 6.9 | 8 | 9.0 | -20~+60℃ |
| 2. 3. 12 | Discharge over current protection delay time | | ms | 8 | 12 | 16 | 25℃ |
| | | | ms | 7.4 | 12 | 18.5 | -20~+60℃ |
| 2. 3. 13 | Discharge over current protection release | | - | charge release | | | - |
| 2. 3. 14 | Short circuit protection current | | A | 30 | 36 | 42 | 25℃ |
| 2. 3. 15 | Short circuit protection delay time | | μ s | 180 | 250 | 425 | 25℃ |
| | | | μ s | 160 | 250 | 490 | -20~+60℃ |
| 2. 3. 16 | 0V charge inhibition | | V | 0.6 | 0.9 | 1.2 | 25℃ |
| | | | V | 0.5 | 0.9 | 1.3 | --20~+60℃ |
| 2. 3. 17 | TH | B=3435K, ±1% | kΩ | | 10 | | 25℃ |
| 2. 3. 18 | ID | ±2% | kΩ | | 100 | | 25℃ |
| 2. 3. 19 | Operating temperature range | | ℃ | -20~+60 | | | - |



2.4. IQC Spec for EMS/ODM Reference

| | |
|-------------------------------|--|
| Battery Pack output Voltage*1 | (15-30%).....3.71~3.795V |
| Thermistor Value*2 | (a)Ambient=10℃~20℃, TH pin 18.25KΩ-11.95KΩ (b)Ambient=20℃~30℃, TH pin 12.24KΩ-8.213KΩ (c)Ambient=30℃~40℃, TH pin 8.410KΩ-5.736KΩ |
| Battery ID pin value*3 | 98 - 102 kΩ |
| Battery Pin Define | Refer to “5.1 2D drawing” of approval sheet |
| Battery Dimension | Refer to “5.1 2D drawing” of approval sheet |
| Battery Appearance Spec | Refer to “Battery 進料檢驗作業規範” |
| Label Drawing | Refer to “5.3 Label Artwork” of approval sheet |
| Battery Barcode*4 | Refer to “6.2 ASUS Barcode Rule” of approval sheet 0B200-02880000S |
| Gauge Communication Data*5 | NA |

3. Safety Performance

3.1. Pack Performance and Test condition

| No. | Item | | Unit | Max | Remarks |
|---------|---------------------|-----------|----------------------|------|--|
| 3. 1. 1 | Pack cycle life | 500 | $\geq 80\% C_{min.}$ | - | Charge:0.5C to 4.4V,cut off 0.02C ; discharge:0.5C to 3.0V,at 25±2℃,rest 10min. |
| 3. 1. 2 | Current consumption | Operating | μA | 8.0 | 25℃ |
| | | | | 8.7 | -20~+60℃ |
| | | Sleep | | 0.1 | 25℃ |
| | | | | 0.12 | --20~+60℃ |



3.2. Safety Operating Parameters for GB 31241

| Safety parameters | symbol | Typ. |
|---------------------------------------|--------|--------|
| Limited charging voltage | Ucl | 4.4V |
| Upper limited charging voltage | Uup | 4.45V |
| Discharge cut-off voltage | Udo | 3.0V |
| Recommendation charging current | Icr | 1000mA |
| Maximum charging current | Icm | 1900mA |
| Recommendation discharging current | Idr | 760mA |
| Maximum discharging current | Idm | 3600mA |
| Over voltage for charge protection | Ucp | 4.475V |
| Over current for charge protection | Icp | 5A |
| Low voltage for discharge protection | Udp | 2.4V |
| Over current for discharge protection | Idp | 8A |
| Upper limited charging temperature | Tcm | 60 °C |
| Upper limited discharging temperature | Tdm | 60 °C |

3.3. Safety compliance

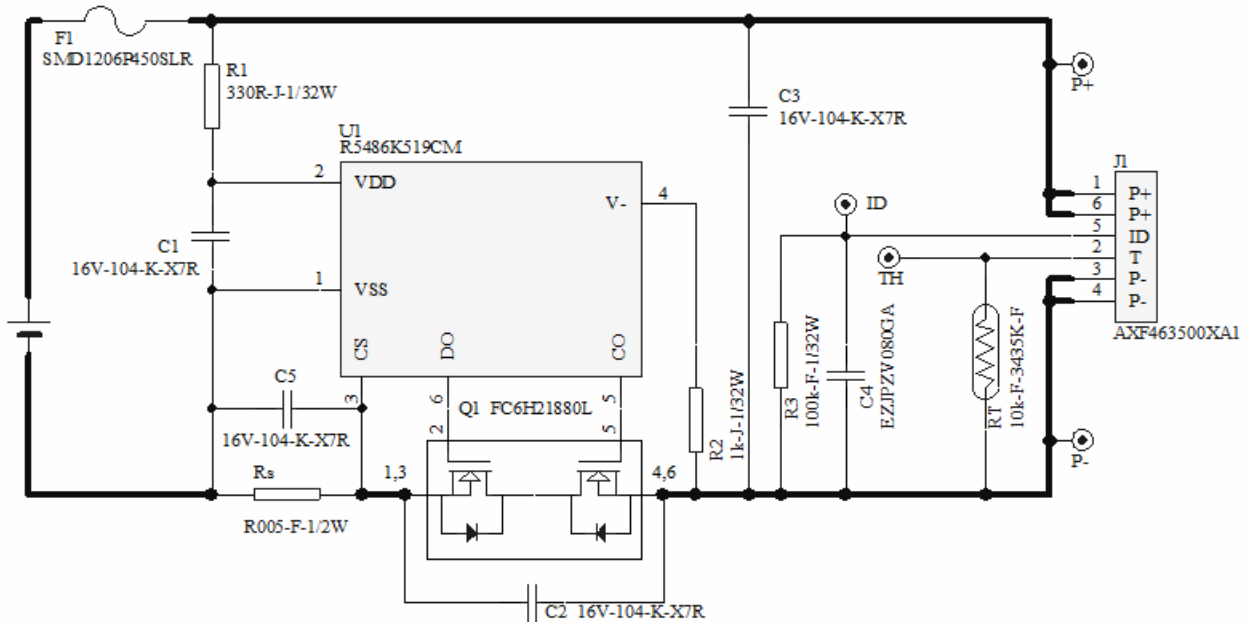
| Items | Conditions and others | Performances |
|--|---|---|
| Over charge protection /过充电保护 | The standard charged battery should be charged at 2 C5A constant current with a constant voltage 7.70V for 7 hours. /电池按规定充电结束后，用恒流恒压源持续给电池加载 7h，恒流恒压源电压设定为 2 倍标称电压，电流设定为 2 C5A 的外接电流，直至实验结束的整个过程。 | The battery shall have no leakage, no venting, no rupture, no fire and no explosion. 电池应不泄露、不泄气、不破裂、不起火和不爆炸。 |
| Over discharge protection /过放电保护 | After standard discharged, the battery is connected with a 30 Ω load to discharge for 7hrs. 电池按 0.2C5A 放电终止后，外接一个 30 Ω 的负载放电 7 个小时。 | The battery shall have no leakage, no venting, no rupture, no fire and no explosion. 电池应不泄露、不泄气、不破裂、不起火和不爆炸。 |
| External short-circuiting Protection 外部短路保护 | The standard charged battery is to be short-circuited by connecting the positive and negative terminals of the battery with copper wire having a resistance about 80m Ω \pm 20 m Ω . /电池按规定充电结束后，将正负极用 80m Ω \pm 20 m Ω 导线短路 1h。 | The battery shall have no leakage, no venting, no rupture, no fire and no explosion. 电池应不泄露、不泄气、不破裂、不起火和不爆炸。 |
| Drop impact test /重物冲击测试 | Battery is to be placed on a flat surface. To place 15.8mm \pm 0.2mm diameter bar across the center of standard charged battery, and drop 9.1kg weight from 610 \pm 25mm height onto the battery. Then keep for 6hr, /充电的电池放置于平面冲击台上，并将一个直径 15.8mm 的钢柱放置于电池中心，钢柱的纵轴平行于平面，让质量 9.1kg 的重物从 610mm \pm 25mm 高度自由落到电池中心上方的钢柱上，测试完毕，观察 6 小时。 | No fire, no explode /电池应不起火、不爆炸。 |



| | | |
|-------------------------|---|--|
| Heating test /热滥用 | A battery is to be heated in a circulating air oven. The temperature of the oven is to be raised at a rate of $(5^{\circ}\text{C} \pm 2^{\circ}\text{C})/\text{min}$ to a temperature of 130°C . The oven is to remain for 30 minutes. /电池放置于热箱中，温度以 $(5^{\circ}\text{C} \pm 2^{\circ}\text{C})/\text{min}$ 的速率升至 $130^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 并保温 30min。 | No fire, no explode /电池应不起火、不爆炸。 |
| Over charge /过充电 | A fully discharged battery is to be placed in a circulating air oven, connected with thermocouple. Charged with CV, 4.6V and CC.3 C5A until the battery voltage up to 4.6V, The test should be finished when the battery meet any of the conditions as below: 1) battery has been charged for 7hr. 2) the temperature of battery lower than peak temperature about 20% /本项试验应在拆除电池外保护线路后进行。 将接有热电偶的电池置于通风橱中，连接正负极于一恒流恒压电源，调节电流至 3C5A，电压为 4.6V，然后对电池以 3C5A 充电，直到电池电压为 4.6V 后，同时达到以下测试条件之一实验结束： 1) 充电时间达到 7 小时 2) 电池温度低于峰值温度 20% | Without PCM, no fire, no explode /电池应不起火、不爆炸。 |
| Force discharge 强制放电 | The test should be conducted under $20 \pm 5^{\circ}\text{C}$. The batter is reverse charged with 1C5A after standard discharged to cut of voltage. Charge time is not less than 90 min. 测试要求在 $20 \pm 5^{\circ}\text{C}$ 的环境温度 下进行。 电池以 0.2 C5A 进行放电至终止电压，然后以 1 C5A 的电流对电池进行反向充电，要求充电时间不低于 90 分钟。 | No fire, no explode /应不起火、不爆炸 |
| Short Circuit /短路 | The test should be conducted under $55 \pm 5^{\circ}\text{C}$. A cell is to be placed in a circulating air oven. Connected with thermocouple. The cell is to be short-circuited by connecting the positive and negativeterminals of the cell with copper wire having a resistance about $80\text{m}\Omega \pm 20\text{m}\Omega$. The test should be finished when the cell meet any of the conditions as below: 1) The cell has been shorted for 24hr. 2) The temperature of cell lower than peak temperature about 20% /本项试验应在拆除电池外保护线路后进行。 将接有热电偶的电池置于通风橱中，短路其正负极（线路总电阻不大于 $80\text{m}\Omega \pm 20\text{m}\Omega$ ），试验过程中监视电池温度变化，当达到以下条件之一实验结束： 1) 短路时间达到 24 小时 2) 电芯温度低于峰值温度 20% | Without PCM, no fire, no explode, the temperature of cell surface no more than 150°C . /结束试验。应不起火、不爆炸，电池的外部温度不得高于 150°C 。 |
| Thermal Shock 温度循环 | Battery (standard charged) is repeatedly tested with 10 times heat cycling, which means maintaining the battery for 6 hours at $-40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and $75^{\circ}\text{C} \pm 2^{\circ}\text{C}$ respectively. The interval of temperature change is kept in 30min. 电池充满电后，将电池放入温控箱中， 1) 在温度 $75^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 的实验箱中保持 6 小时 2) 将实验箱温度降为 $-40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ，保持 6 小时 3) 温度转换时间不大于 30 分钟 4) 重复步骤 1) ~2)，共循环 10 次。 | The battery shall no leakage, no venting, no rupture, no fire and no explosion. 电池应不泄露、不泄气、不破裂、不起火和不爆炸。 |
| ESD (静电) | The standard charged battery should be test under ESD $\pm 8\text{kV}$ contact discharge and $\pm 15\text{kV}$ air discharge for each 20 times. The interval of discharge is 1 second. 对充饱电后的电池（金属端子）进行 $\pm 8\text{kV}$ 接触放电与 $\pm 15\text{kV}$ 空气放电各 20 次，每次放电间隔 1 秒。 | The function of battery is work well. 电池所有功能正常。 |

4. Circuit Diagram

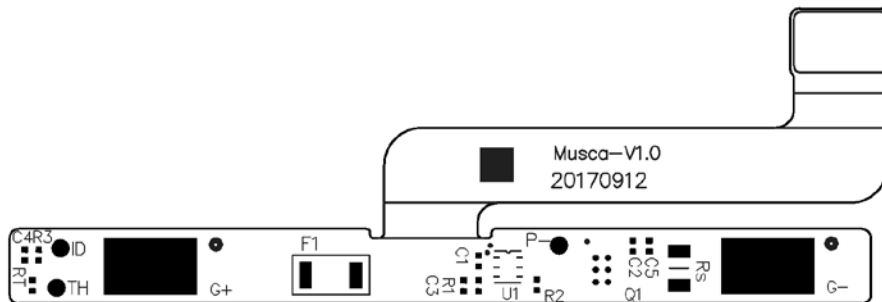
4.1. Schematic



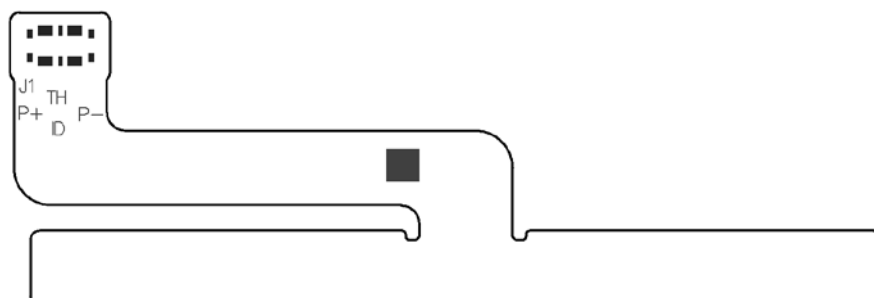
4.2. Component Placement

FPC:

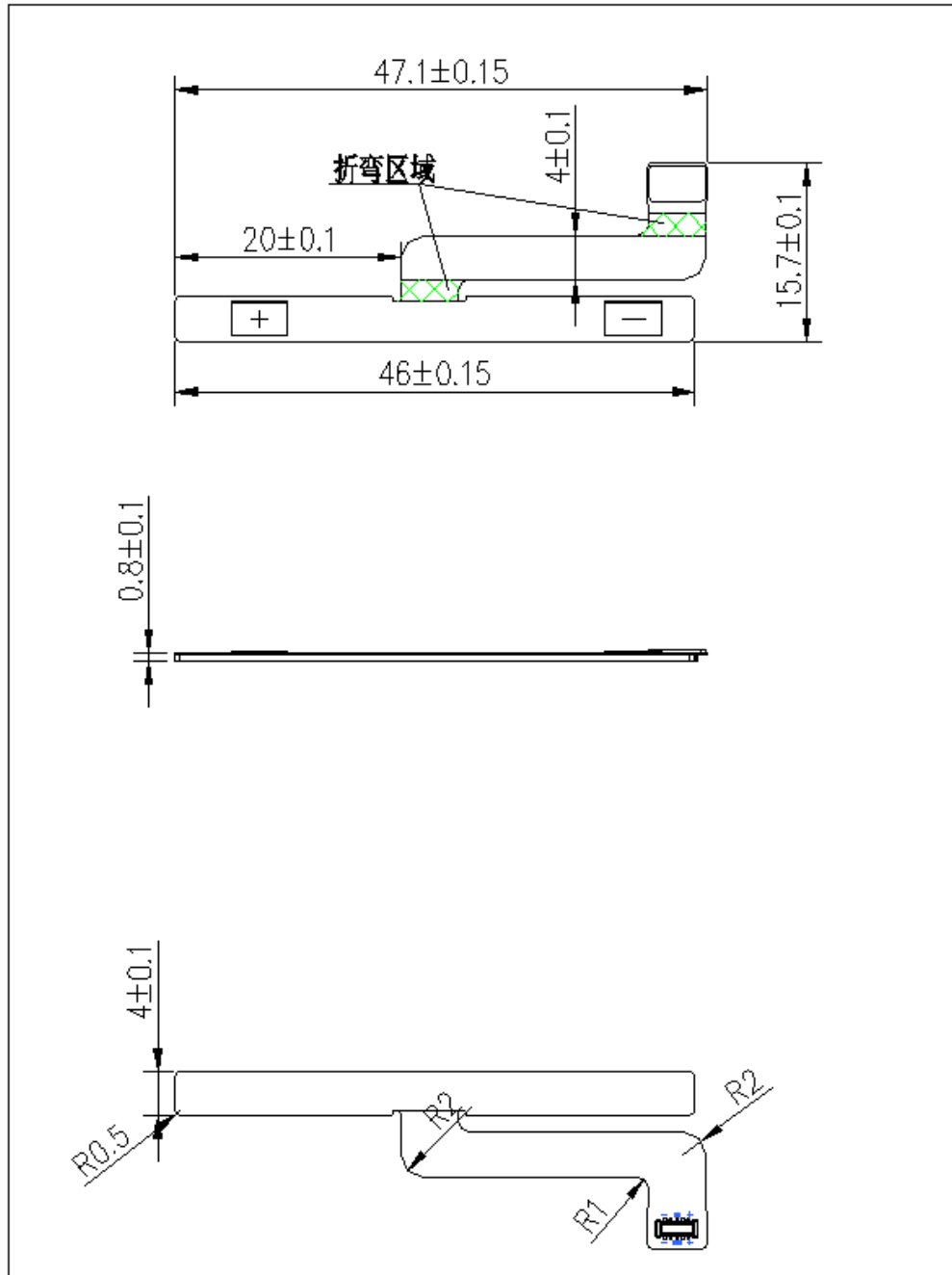
Top :



Bottom:



Size:



FPC 厚度: 0.15 ± 0.03 mm

FR4 补强板区域厚度: 0.8 ± 0.1 mm

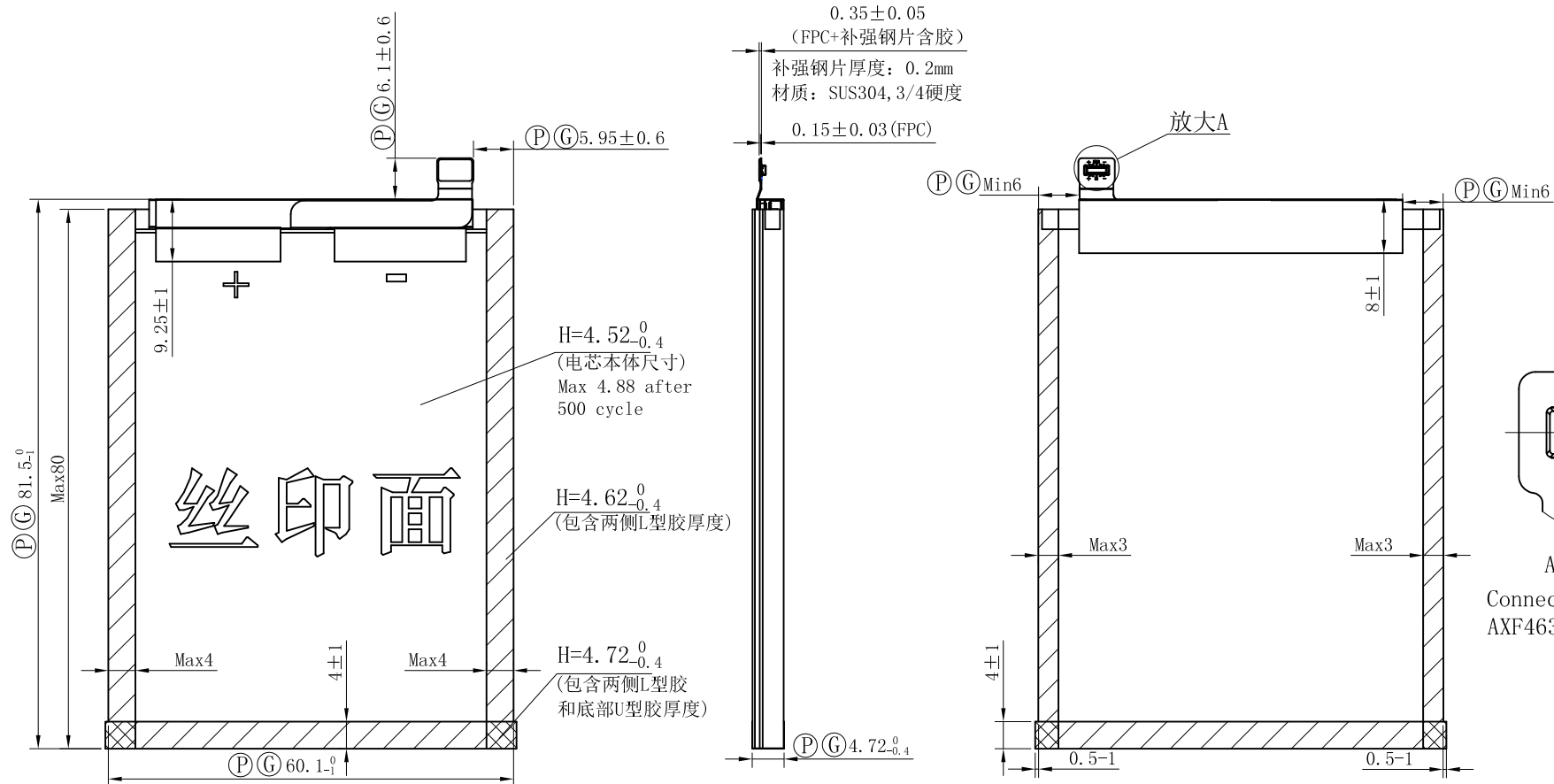


SCUD (Fujian) Electronics Co., Ltd.

5. Mechanical Specification

5.1. 2D Drawing

| RAV | DESCRIPTION | ISSUED BY | DATE |
|------|-------------|-----------|------------|
| v1.0 | 首次发行 | 陈 成 | 2017.09.20 |



| | | | |
|----------|------|----------|------|
| Pin Seq. | Name | Pin Seq. | Name |
| 1&6 | P+ | 3&4 | P- |
| 2 | NTC | 5 | ID |

| | |
|-------|----|
| 媒体编号 | |
| | |
| 旧底图总号 | |
| | |
| 底图总号 | |
| | |
| 日期 | 签名 |
| | |

技术要求:

1. 所有标注尺寸为成品尺寸, 所有未标注特征请参考3D文件;
2. 产品表面应平整、无划伤、丝印完整可辨识;
3. 贴纸无起翘、气泡、划伤等;
4. 产品符合ROHS、无卤;
5. 电池厚度检测方法: 厚度检测夹具(通止规);
6. 电池长宽检测方法: 长宽检测夹具(通止规);
7. 钢片补强 $T=0.2$, $SU304$ 3/4H, 与FPC接地, 阻抗 $<1\Omega$;
8. 带ⓅⓈ号的尺寸为重点检查尺寸, 未注公差为: $\pm 0.2\text{mm}$ 。
9. 产品的重量: ?g

| | | | | | | |
|-------|----|-----|----|------|----|----|
| 媒体编号 | | 品号 | | | | |
| | | | | | | |
| 旧底图总号 | | | | | | |
| | | | | | | |
| | | 标记 | 数量 | 更改单号 | 签名 | 日期 |
| 底图总号 | | 设计 | | | | |
| | | 审核 | | | | |
| 日期 | 签名 | 标准化 | | | | |
| | | 批准 | | | | |

镀涂

外形图
(Musca-华硕)

结构图

DWX003225

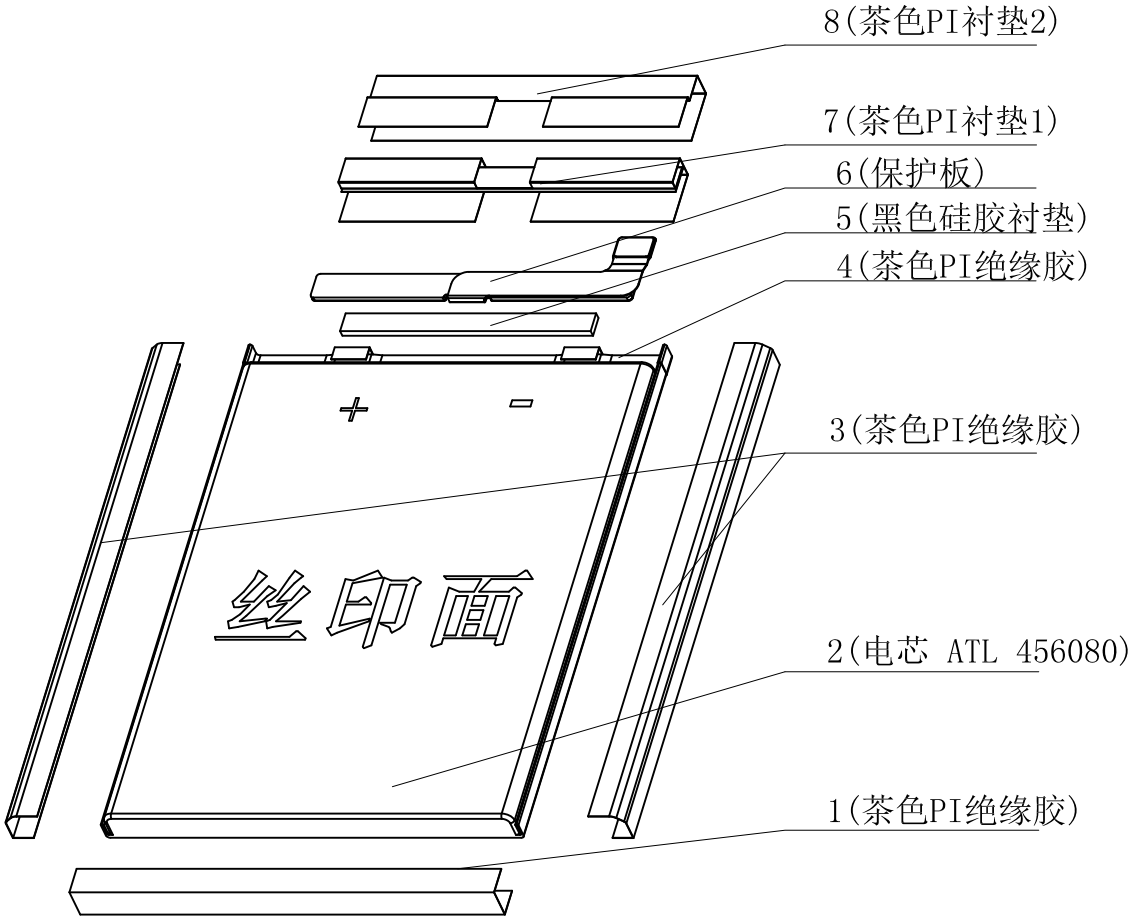
| | | |
|---|-------|-----|
| 象 限 | 重 量 | 比 例 |
|  | | 1:1 |
| 第 1 张 | 共 1 张 | |
| 飞毛腿(福建)电子有限公司 | | |



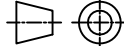
SCUD (Fujian) Electronics Co., Ltd.

5.2. Explosion Diagram

| RAV | DESCRIPTION | ISSUED BY | DATE |
|------|-------------|-----------|------------|
| v1.0 | 首次发行 | 陈成 | 2017.09.14 |



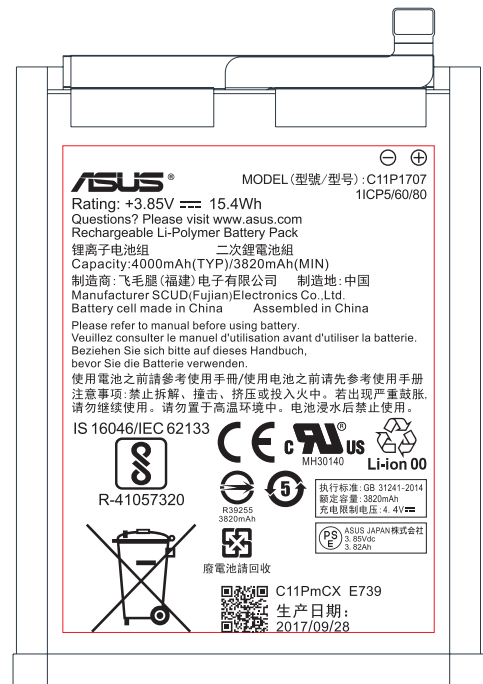
| | | | | |
|-------|----|-----|-----------|-----------------------|
| | | 8 | 茶色PI衬垫2 | T=0.05 VTM-1 ROHS+HF |
| | | 7 | 茶色PI衬垫1 | T=0.05 VTM-1 ROHS+HF |
| | | 6 | 保护板 | PCB T=0.60 FPC T=0.15 |
| 媒体编号 | | 5 | 黑色硅胶衬垫 | T=1.0 VTM-1 ROHS+HF |
| | | 4 | 茶色PI绝缘胶 | T=0.05 VTM-1 ROHS+HF |
| 旧底图总号 | | 3 | 茶色PI绝缘胶 | T=0.05 VTM-1 ROHS+HF |
| | | 2 | 电芯 | AT1 456080 3820mAh |
| 底图总号 | | 1 | 茶色PI绝缘胶 | T=0.05 VTM-1 ROHS+HF |
| 日期 | 签名 | S/N | Part Name | Spec drscription |

| | | | | | | | | |
|------------------------------------|----|-------------------------|------|---|-----------------------------|---|-----|------------|
| Object/Part NO | | Manufacturer/ Trademark | | Type/model | Technical data/ (thickness) | | | |
| Aluminum Laminated Film (for cell) | | Showa | | 86um | 86um | | | |
| 媒体编号 | 品号 | | | 镀涂 | _____ | | | |
| | 1 | | | 爆炸图 (Musca-华硕) | | | | |
| 旧底图总号 | 2 | | | | | | | |
| | 3 | | | | | | | |
| | NO | 数量 | 变更说明 | | | | | |
| 底图总号 | 设计 | | |  | | 象 限 | 重 量 | 比 例 1:1 |
| | 审核 | | | | | | | |
| 日期 | 签名 | 标准化 | | 结构图 | | 第 1 张 共 1 张 飞毛腿(福建)电子有限公司 | | |
| | | 批准 | | | | | | |



SCUD (Fujian) Electronics Co., Ltd.

5.3. Label Artwork



技术要求

- 颜色, 字体, 尺寸, 标志按彩色菲林制造.
- 符合无卤、ROHS等环保要求.
- C11PmCX E739**(包含中间空格)
C11:电池类型代码,Polymer 1S1P
P:电芯类型代码,Polymer 电池
m:电芯容量代码,3700-3999mAh
C:电芯代码,ATL 电芯
X:供应商代码,SCUD
E:生产阶段(由业务下单提供; S: SR 阶段、E: ER 阶段、P: PR 阶段、M: MP阶段)
739:生产日期YWW,2017年第39周 (年份取最后一位)
- 二维码规则:(QR CODE, 6x6mm; 解析度200dpi, 暗码)
>>>0B200-02880000E00A107390001(共27位)
0B200-02880000:固定不变
E:生产阶段(由业务下单提供; S: SR 阶段、E: ER 阶段、P: PR 阶段、M: MP阶段)
00A1: PCBA代码 (无Gauge, IJ为: 00 KL: A1)
0:EEPROM代码, 无Gauge, 固定为“0”
739:生产日期YWW,2017 年第39周 (年份取最后一位)
0001:4位流水号, 32位进制排列, 从0000到ZZZZ滚动(字母I、O、Q、U除外), 不得重复
注: 实际生产日期与铭牌或丝印上所打的生产日期不能超过三天

丝印印刷标准:

- 移印区贴上3M胶后 负重500g的砝码, 擦拭15次 (来回算一次), 拿住胶带一侧以180度方向用力撕起。
要求移印内容可辨认、没有掉墨。
- 喷码位置, 测试前扫描条码确认其好扫码。在喷码区贴上3M胶后 负重500g的砝码, 擦拭15次 (来回算一次), 拿住胶带一侧以180度方向用力撕起。
要求喷码内容可辨认、清晰可读可扫码。
- 将无尘布用水完全湿透, 用100g砝码压住无尘布在待测区域之喷码文字上来回摩擦20次
要求移印内容可辨认、没有掉墨;喷码内容可辨认、清晰可读可扫码。

| | | | | | | | | | | | |
|-------|----|-----|----|-------------|-------------------------------------|-----|--|-------|-----------|---------------|--|
| 媒体编号 | | 品号 | | H3021560004 | | 镀 涂 | | 见技术要求 | | | |
| | | | | | | | | | | | |
| 旧底图总号 | | 3 | | | 移印(ATL) Musca-华硕 银底黑字 | | | | DYS005255 | | |
| | | 2 | | | | | | | | | |
| | | 1 | | | | | | | | | |
| | | NO. | 日期 | 变更说明 | | | | | | | |
| 底图总号 | | 设 计 | | | | 象 限 | | 重 量 | | 比 例 | |
| | | 审 核 | | | | | | | | | |
| | | 安 规 | | | | | | | | | |
| 日期 | 签名 | 标准化 | | | | 第 张 | | 共 2 张 | | 飞毛腿(福建)电子有限公司 | |
| | | 批 准 | | | | | | | | | |



SCUD (Fujian) Electronics Co., Ltd.

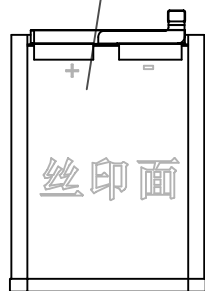
5.4. Six Side Battery Photograph



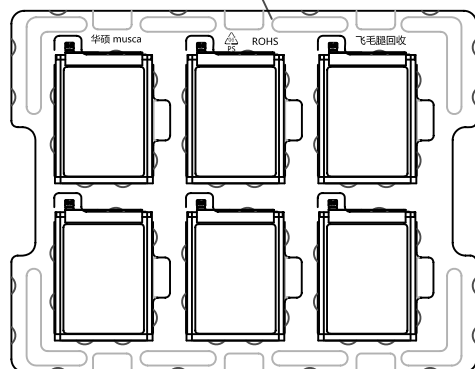
SCUD (Fujian) Electronics Co., Ltd.

5.5. Packing Data

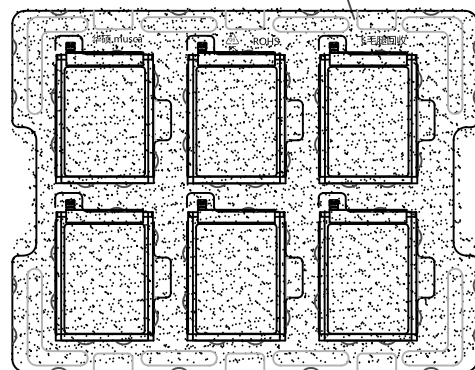
成品示意图



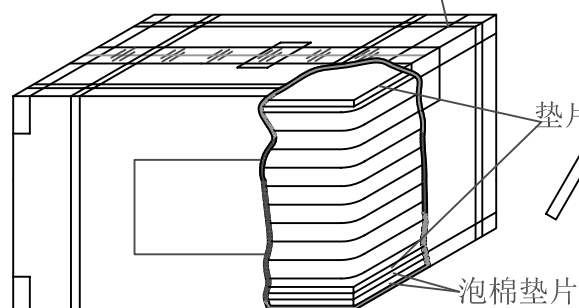
装入托盘



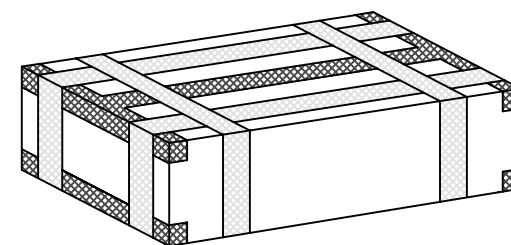
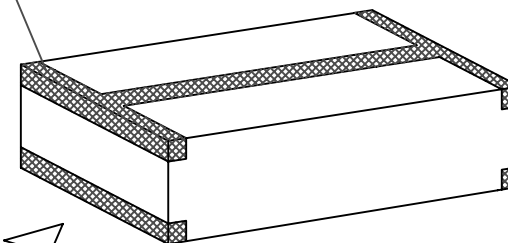
盖PE膜



内箱：装21层托盘，6pcs/盘，共120pcs/箱
最上面一层没有放，用大PE袋包起



60mm透明胶



大外箱：装2个内箱，共240PCS/箱

媒体编号

旧底图总号

底图总号

日期 签名

格式(2)

| | | | |
|-----|------|----|------|
| 3 | | | |
| 2 | | | |
| 1 | V1.0 | | |
| NO. | 版本 | 日期 | 变更说明 |
| 设计 | | | |
| 审核 | | | |
| 工艺 | | | |
| 标准化 | | | |
| 批准 | | | |

包装示意图
Musca(华硕)

DQT002909

| 象 限 | 重量 | 比 例 |
|---|-------|-----|
|  | | |
| 第 1 张 | 共 1 张 | |
| 飞毛腿(福建)电子有限公司 | | |

幅面：A3

版本：V1.0



6. Appendix

6.1. Caution and Prohibition

6.1.1. Others

1.Odor

The battery do not product special smell or harmful odor.

2.Protection for Environment

The material used for packing should meet the criterion to protect environment.

6.1.2. Warning and notice

WARNING

1. Do not put the battery into a fire, or heat the battery.
2. Do not store the battery in high temperature environment.
3. Do not connect the battery reversed in positive (+) and negative (-) terminals in the charger or equipment.
4. Do not let the battery terminals (+ and -) contact a wire or any metal (like a metal necklace or a hairpin) with which it carried or stored together, may cause short-circuit.
5. Do not drive a nail in, hit with a hammer, or stamp on the battery, do not strike the battery in other ways.
6. Do not disassemble or alter the batteries' outside structure.
7. Do not submerge the battery in water, do not wet the battery when store the battery.

NOTICE

1. Battery should be charged and discharged with proper charger, in compliance with correct operation contents
2. Do not use the battery with other maker's batteries, different types and /or models of batteries such as dry batteries, nickel-metal hydride batteries, or nickel-cadmium batteries, or new and old lithium batteries together.
3. Do not leave the battery in a charger or equipment if it generates an older and/or heat, changes color and/or shape, leaks electrolyte, or cause any other abnormality.
4. Do not discharge the battery continuously when it is not charged.



Caution

1. Complete instructions as to how to replace the battery including the following or equivalent statement: Dispose of used battery promptly. Keep away from children.
2. Caution – The battery used in this device may present a risk of fire or chemical burn if mistreated. Do not disassemble, heat above (manufacturer's maximum temperature limit), or incinerate. Replace battery with (battery manufacturer's name or end product manufacturer's name and part number) only. Use of another battery may present a risk of fire or explosion.”
3. For long-term storage, please charge at 0.5C for about one hour in advance.
4. Do not use the battery in other than the following conditions; otherwise, the battery might cause heat generation, damage, or deterioration of its performance.
 - 1) Do not put the battery into a fire, or heat the battery.
 - 2) Do not store the battery in high temperature environment.
 - 3) Do not connect the battery reversed in positive (+) and negative (-) terminals in the charger or equipment.
 - 4) Do not let the battery terminals (+ and -) contact a wire or any metal (like a metal necklace or a hairpin) with which it carried or stored together, may cause short-circuit.
 - 5) Do not drive a nail in, hit with a hammer, or stamp on the battery, do not strike the battery in other ways.
 - 6) Do not disassemble or alter the batteries' outside structure.
 - 7) Do not submerge the battery in water, do not wet the battery when store the battery.



6.2. ASUS Barcode Rule

| | | | | |
|------------------|----------------|---|---|--------------------------|
| Barcode Sequence | Code | Definition | | Printing |
| | ABC | Battery pack type & xSxP A 码标示 [A]代表 Cylindrical 电池 [B]代表 Prismatic 电池 [C]代表 Polymer 电池 B 与 C 码代表 pack 的串并数 | | C11 |
| | D | Battery Cell Type [L]代表 Li-ion 电池 [P]代表 Polymer 电池 [B]代表 Prismatic 电池 [N]代表 Ni-MH 电池 | | P |
| | E | Battery Cell Capacity | | m |
| | | [a]代表100-399mAh | [k]代表3100-3399mAh | |
| | | [b]代表400-699mAh | [l]代表3400-3699mAh | |
| | | [c]代表700-999mAh | [m]代表3700-3999mAh | |
| | | [d]代表1000-1299mAh | [n]代表4000-4299mAh | |
| | | [e]代表1300-1599mAh | [o]代表4300-4599mAh | |
| | | [f]代表1600-1899mAh | [p]代表4600-4899mAh | |
| | | [g]代表1900-2199mAh | [q]代表4900-5199mAh | |
| | | [h]代表2200-2499mAh | [r]代表5200-5499mAh | |
| | | [i]代表2500-2799mAh | [s]代表5500-5799mAh | |
| | | [j]代表2800-3099mAh | [y]代表 mixing cell design [multiple cell models a pack] | |
| | F | Cell Vender [2]代表 SDI 电芯 [4]代表 Panasonic 电芯 [C]代表 ATL 电芯 [J]代表光宇电芯 | | C |
| | G | Battery Module Vender [X]代表 SCUD | | X |
| | abdce-fghijklm | ASUS P/N | | 0B200-02880000 |
| | H | Stage S: SR stage (ASUS 料号含 S) E: ER stage (ASUS 料号含 E) P: PR stage (ASUS 料号含 P) M: MP stage (ASUS 料号含 M) | | 由 PRJ 指定 |
| | IJ | Gauge board PCBA Ver. A01=>A1, B02=>B2, 以此类推, 若无以00表示 | | 00 |
| | KL | Protection board PCBA Ver. A01=>A1, B02=>B2, 以此类推, 若无以00表示 | | A1 |
| | M | EEPROM code 无 Gauge, 固定为“0” | | 0 |
| | N | Year Code 年 (西元, 只显示个位数) | | 年份最后一位 |
| | OP | Week Code 周别 | | 周别 |
| | QRST | Serial Number 32进位流水码 | | 0000-ZZZZ (除 IOQU 除外) |

**6.3. UL Key Parts list**

| No. | Type | Symbol | Description | Qty. | Manufacturer | Package | Standard |
|--------|--------------------|-----------------|--|------|--------------|---------|--|
| 6.3.1 | Protector IC | U1 | R5486K519CM | 1 | Richo | SSON-6J | IEC62133 |
| | Protector IC(ALT.) | | MM3722KF6RRE | | Mitsumi | | |
| 6.3.2 | N MOS-FET | Q1 | FC6H21880L | 1 | Panasonic | CSP6 | IEC62133 |
| 6.3.3 | Resistor | R1 | 330R \pm 5% 1/16W | 1 | Yageo | 0201 | - |
| 6.3.4 | Resistor | R2 | 1k \pm 5% 1/16W | 1 | Yageo | 0201 | - |
| 6.3.5 | Resistor | R3 | 100k \pm 1% 1/16W | 1 | Yageo | 0201 | - |
| 6.3.6 | Varistor | C4 | EZJPZV080GA | 1 | Panasonic | 0201 | - |
| 6.3.7 | Resistor | Rs | 5m Ω \pm 1% 1/2W | 1 | Ralec | 0805 | - |
| | Resistor(ALT.) | | | | Wellcomp | | |
| 6.3.8 | NTC | RT | 10k \pm 1% B=3435K \pm 1% (B25/85) | 1 | TDK | 0201 | IEC62133 |
| | NTC(ALT.) | | | | Murata | | |
| 6.3.9 | PTC | F1 | SMD1206P450SL R | 1 | PTTC | 1206 | EN60730-1/EN60738-1/EN60739-1; UL1434 |
| 6.3.10 | Capacitor | C1,C2, C3,C5 | 16V-104-K-X7R | 4 | Murata | 0201 | - |
| 6.3.11 | Nickel | B+,B- | 6*2.7*0.1 | 2 | Da Tong | - | - |
| 6.3.12 | Connector | J1 | AXF463500XA1 | 1 | Panasonic | 6 Pins | UL94 |
| 6.3.13 | FPCB | - | Musca-V1.0 | 1 | Assuny | 2 Layer | UL796 |

6.4. Safety Regulation Compliance

| Certification Project | Standard test |
|-----------------------|----------------------------|
| UN38.3 测试 | UN38.3 |
| 1.2m 跌落测试 | / |
| PI965 空海运鉴定书 | / |
| CB | IEC62133+IEC60950-1 |
| CE | EMC EN6100-6-1+EN61000-6-3 |
| BSMI | CNS 15364 |
| BIS | IS16046:2015 |
| UL | UL2054+UL60950-1 |
| CQC | GB31241:2014 |
| PSE | Appendix9 |
| CTIA | IEEE1725 |
| MSDS | / |

6.5. Cell Specification



PRODUCT SPECIFICATION

DOC NO. : PS-GC-456080-02REV. : Draft 6SHEET : 1 of 15

ECN NO. : _____

Cell Specification Confirmation Sheet

of

Amperex Technology Limited (“ATL”)

ATL Product Part Number: TBD

| Prepared by SLS | Approved by SLS | Approved by R&D | Approved by ENG | Approved by QA |
|--------------------|--------------------|--------------------|--------------------|-------------------|
| Elvis Huang | Wayne Wang | ZD Zhang | Peter Zhang | Magic Ma |

| | | | |
|--------------------------|-------------------------------|------------|------|
| Customer Confirmation | Authorized Signatory | | Date |
| | Signature | Print Name | |
| | Company Name Of Customer: | | |
| | Company Stamp Of Customer: | | |

Confidential : () Level 3 Private confidential () Level 2 High confidential (V) Level 1 Low confidential



PRODUCT SPECIFICATION

DOC NO.: PS-GC-456080-02REV. : Draft 6SHEET : 2 of 15

AMENDMENT RECORDS

| Revision | Description | Originator | Date |
|----------|---|-------------|------------|
| Draft 1 | New release | Elvis Huang | 07/20/2017 |
| Draft 2 | Updated the Nominal Capacity in the page 4 item 4.4 | Elvis Huang | 08/29/2017 |
| Draft 3 | Updated the charge/discharge condition in the item 4.7 Updated the cycle life in the item 5.1.2 Updated the Initial Impedance in the item 5.1.4 & item 6 Updated the cell voltage in the item 5.1.5 & item 6 Added the charge current & discharge current for safety in the item 5.3.3 & item 5.3.4 Updated the item 7.1.2 / 7.1.4 / 7.3.1 / 7.3.7 | Elvis Huang | 08/29/2017 |
| Draft 4 | Added the item 5.1.6 ~ 5.1.9 in the page 5 & page 6 Updated the Initial Impedance in the item 5.1.4 & item 6 Updated the cell drawing in the item 6 | Elvis Huang | 08/30/2017 |
| Draft 5 | Updated the cell capacity in the item 4.4 & 4.5 Updated the Drawing in the item 6 | Elvis Huang | 09/01/2017 |
| Draft 6 | Updated the cell voltage in the item 5.1.5 & item 6 | Elvis Huang | 09/01/2017 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |



PRODUCT SPECIFICATION

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SHEET : 3 of 15

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PRODUCT SPECIFICATION

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1 Scope:

The purpose of this document is to specify the specifications of the Lithium-ion Polymer ("LIP") rechargeable battery cells with ATL Part Number-**TBD**- ("Product" or "Cell") to be supplied by ATL to Customer under Customer's purchase order and ATL's confirmation relevant to the Product. For the avoidance of doubt, the specifications specified herein do not apply to any Host Device, apparatus, instrument, equipment or hardware device containing Product or Cell ("Host Device").

2 Model Number: 456080L.

3 Standard Environmental Test Conditions:

1): Unless otherwise specified, all tests stated in this Product Specification are conducted at below conditions:

Temperature: 25 ± 3 °C ("Temperature Condition")

Humidity: $65 \pm 20\%$ RH ("Humidity Condition")

2): Throughout this specification, numeric criteria annotated by "*" means such criteria are only applicable to fresh unused Product within 30 days from manufacture by ATL. Products either have been used or stored for a period longer than 30 days by Customer and/or its customer may exhibit an inferior numeric parameter than such criteria.

Customer agrees that such occurrence does not constitute nonconformance of specification.

4 Detailed Specifications ("Detailed Specifications"):

The specifications listed in this Section 4 shall be the detailed specifications for the Product ("**Detailed Specifications**").

| No. | Items | | Specifications |
|-----|---|--------------------------|--|
| 4.1 | Charge Cut off Voltage | | 4.4V |
| 4.2 | Nominal Voltage | | 3.85V |
| 4.3 | Discharge Cut-off Voltage | | 3.0V for capacity measure |
| 4.4 | *Nominal Capacity | | 4000mAh with 0.2C _{min} Discharge |
| 4.5 | *Minimal Capacity ("C _{min} ") | | 3820mAh with 0.2C _{min} Discharge |
| 4.6 | Standard Charge | | 0.2C _{min} CC (constant current) charge to 4.4V, then CV (constant voltage 4.4V) charge till charge current decline to 0.02C _{min} |
| | Standard Discharge | | 0.2C _{min} CC (constant current) discharge to 3.0V |
| 4.7 | Charge/Discharge | Cell surface temperature | Charge Current and Voltage |
| | Charge | 0 °C to 10 °C | 0.3C _{min} Max to 4.4V, then CV to 0.02C _{min} cut off |
| | | 10 °C to 20 °C | 0.5C _{min} Max to 4.4V, then CV to 0.02C _{min} cut off |
| | | 20 °C to 50 °C | 1.0C _{min} Max to 4.25V, 0.5C _{min} to 4.4V, then CV to 0.02C _{min} cut off |
| | | 50 °C to 60 °C | 0.5C _{min} Max to 4.1V |
| | Discharge | -20 °C to 60 °C | 1.5C _{min} Max to 3.0V |
| 4.8 | Storage Temperature | | -20 °C to + 45 °C within 3 months with shipping status 25±3 °C over three months (refer to Item7.5 in the Appendix) |
| 4.9 | Cell Weight | | 50g for reference only |



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4.10

Cell Dimension (refer to Section 6 Drawing)

Length: 78.3~79.5mm

Width: 59.0~60.0mm

Thickness: 4.12~4.52mm Max

5 Cell Performance Criteria:

5.1 Electrical characteristics:

| No. | Items | Test Method and Condition | Criteria |
|-------|-------------------------------|--|---|
| 5.1.1 | *Cell Capacity | The capacity means the discharge capacity of the cell, which is measured with discharge current of $0.2C_{min}$ with 3.0V cut-off voltage after the standard charge. Standard charge: $0.2C_{min}$ CC (constant current) charge to 4.4V, then CV (constant voltage 4.4V) charge till charge current decline to $0.02C_{min}$ | $\geq C_{min}$ |
| 5.1.2 | *RT Cycle life | Charge Cell with $1.0C_{min}$ to 4.25V, $0.5C_{min}$ to 4.4V, then CV to $0.02C_{min}$ and discharge cell with $0.5C_{min}$ discharging current until battery voltage reaches 3.0V. Repeat to 500 th cycles, record remained capacity of 500 th cycle. Test temperature: $25\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$. | $\geq 80\%$ of $C_{initial}$ (=First cycle capacity) |
| | | For 501 th , Charge Cell with $1.0C_{min}$ to 4.25V, $0.5C_{min}$ to 4.4V, then CV to $0.02C_{min}$ and discharge cell with $0.5C_{min}$ discharging current until battery voltage reaches 3.0V. Repeat to 501 th cycles, record remained capacity of 501 th cycle. Test temperature: $25\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$. | $\geq 80\%$ of C_{min} . |
| 5.1.3 | *Self-discharge | After the charging specified in the Detailed Specifications, storied the cells for 28days, then measured the capacity with $0.2C_{min}$ till 3.0V | Residual capacity > 90% |
| 5.1.4 | *Initial Impedance | Internal resistance measured at AC 1KHz after 50% charge | $\leq 50\text{mohm}$ |
| 5.1.5 | *Cell Voltage(As of shipment) | Air transport (IATA require shipping voltage $\leq 30\%$ SOC) | 3.74~3.795V (20%~30% SOC) |
| 5.1.6 | Charge Rate Capabilities | Charge cell with $1.0C_{min}$ to 4.25V, then $0.2C_{min}$, $0.5C_{min}$, $1.0C_{min}$ full voltage , then CV to $0.02C_{min}$ cut off, and discharge cell with $0.2C_{min}$ discharging current until battery voltage reaches 3.0V. Test temperature: $25\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ | $\geq 100\%$ of C_{min} with charge method |
| | | | $\geq 100\%$ of C_{min} with $0.2C_{min}$ charge |
| | | | $\geq 100\%$ of C_{min} with $0.5C_{min}$ charge |
| | | | $\geq 95\%$ of C_{min} with $1.0C_{min}$ charge |
| 5.1.7 | Discharge Rate Capabilities | Charge cell with $1.0C_{min}$ to 4.25V, $0.5C_{min}$ to full voltage , then CV to $0.02C_{min}$ cut off , and | $\geq 100\%$ of C_{min} with $0.2C_{min}$ discharge |
| | | | $\geq 95\%$ of C_{min} with $0.5C_{min}$ discharge |



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| | | | |
|-------|--|---|--|
| | | discharge cell with $0.2C_{min}$, $0.5C_{min}$, $1.0C_{min}$, $1.5C_{min}$ discharging current until battery voltage reaches 3.0V. Test temperature: $25\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ | $\geq 88\%$ of C_{min} with $1.0C_{min}$ discharge $\geq 75\%$ of C_{min} with $1.5C_{min}$ discharge |
| 5.1.8 | Temperature Dependence of Charge Capacity | Charge Cell with charge method specified in the Detailed Specifications, and discharge cell with $0.2C_{min}$ discharging current until battery voltage reaches 3.0V. Test temperature: Charge at $0\text{ }^{\circ}\text{C}$, $25\text{ }^{\circ}\text{C}$, $45\text{ }^{\circ}\text{C}$ Discharge at $25\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ | $\geq 60\%$ of C_{min} at $0\text{ }^{\circ}\text{C}$ charge $\geq 100\%$ of C_{min} at $25\text{ }^{\circ}\text{C}$ charge $\geq 98\%$ of C_{min} at $45\text{ }^{\circ}\text{C}$ charge |
| 5.1.9 | Temperature Dependence of Discharge Capacity | Charge cell with $1.0C_{min}$ to 4.25V, then $0.5C_{min}$ to full voltage, then CV to $0.02C_{min}$ cut off, and discharge cell with $0.2C_{min}$ discharging current until battery voltage reaches 3.0V. Test temperature: Charge at $25\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ Discharge at $-20\text{ }^{\circ}\text{C}$, $-10\text{ }^{\circ}\text{C}$, $0\text{ }^{\circ}\text{C}$, $25\text{ }^{\circ}\text{C}$, $45\text{ }^{\circ}\text{C}$, $60\text{ }^{\circ}\text{C}$ | $\geq 50\%$ of C_{min} at $-20\text{ }^{\circ}\text{C}$ discharge $\geq 70\%$ of C_{min} at $-10\text{ }^{\circ}\text{C}$ discharge $\geq 85\%$ of C_{min} at $0\text{ }^{\circ}\text{C}$ discharge $\geq 100\%$ of C_{min} at $25\text{ }^{\circ}\text{C}$ discharge $\geq 99\%$ of C_{min} at $45\text{ }^{\circ}\text{C}$ discharge $\geq 98\%$ of C_{min} at $60\text{ }^{\circ}\text{C}$ discharge |

5.2 Mechanical characteristics:

| No. | Items | Test Method and Condition | Criteria |
|-------|----------------|---|-------------------------|
| 5.2.1 | Drop test | Each fully charged cell is dropped three times from a height of 1,0 m on a concrete floor. The cells or batteries are dropped so as to obtain impacts in random orientations. | No fire No explosion |
| 5.2.2 | Vibration Test | A cell is to be subjected to simple harmonic motion with an amplitude of 0.8mm(0.03inch) [1.6mm(0.06inch) total maximum excursion], The frequency is to be varied at the rate of 1 hertz per minute between 10 and 55 hertz, and return in not less than 90 nor more than 100 minutes. The cell is to be tested in three mutually perpendicular directions. For a cell that has only two axes of symmetry, the cell is to be tested perpendicular to each axis. | No fire No explosion |



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| | | | |
|-------|------------|---|-------------------------|
| 5.2.3 | Shock Test | The cell is to be secured to the testing machine by means of a rigid mount which supports all mounting surfaces of the cell. Each cell shall be subjected to a total of three shocks of equal magnitude. The shocks are to be applied in each of three mutually perpendicular directions unless it has only two axes of symmetry in which case only two directions shall be tested. Each shock is to be applied in a direction normal to the face of the cell. For each shock the cell is to be accelerated in such a manner that during the initial 3milliseconds the minimum average acceleration is 75g(where g is the local acceleration due to gravity).The peak acceleration shall be between 125and175g.Cells shall be tested at a temperature of $20\pm5^{\circ}\text{C}$ ($68\pm9^{\circ}\text{F}$). | No fire No explosion |
|-------|------------|---|-------------------------|

5.3 Safety Performance:

| No. | Items | Test Method and Condition | Criteria |
|-------|---------------------|---|-------------------------|
| 5.3.1 | Forced-Discharge | The positive and negative terminals of the sample are to be connected with a copper wire with a maximum resistance load of 0.1ohm. The sample is to discharge until a fire or explosion is obtained, or until it has reached a completely discharged state of less than 0.2 volts and the cell case temperature has returned to $\pm 10^{\circ}\text{C}$ (18 °F) of ambient temperature | No fire No explosion |
| 5.3.2 | External Short Test | Each test sample cell, in turn, is to be short-circuited by connecting the positive and negative terminals of the cell with a circuit load having a resistance load of $80\pm 20\text{mohm}$.The cell is to discharge until a fire or explosion is obtained, or until it has reached a completely discharged state of less than 0.2volts and the cell case temperature has returned to $\pm 10^{\circ}\text{C}$ (18 °F) of ambient temperature, tests are to be conducted at $20\pm 5^{\circ}\text{C}$ ($68\pm 9^{\circ}\text{F}$) and at $55\pm 5^{\circ}\text{C}$ ($131\pm 9^{\circ}\text{F}$) | No fire No explosion |
| 5.3.3 | Charge current | 1.2Cmin Max for 5 seconds at $20^{\circ}\text{C} \sim 45^{\circ}\text{C}$ | No fire No explosion |
| 5.3.4 | Discharge current | 2.0Cmin for 10 seconds, 3.0Cmin for 5 seconds | No fire No explosion |

5.4 Visual inspection:

There shall be no such defects as crack, and leakage, which may adversely affect the performance of cell.

5.5 Warranty period:

The warranty period of Cell is 12months after the manufacture date.



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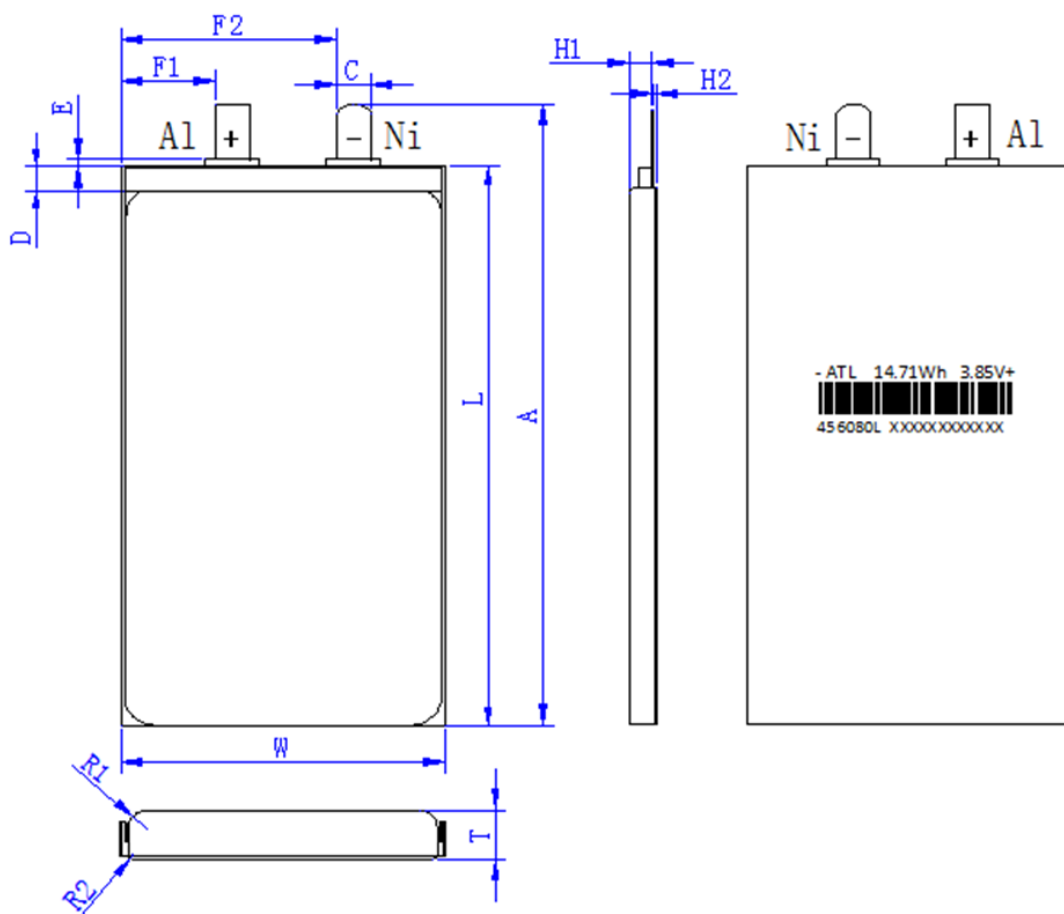
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6 Drawing (all unit in mm, not in scale):

Drawing is for reference only:



| Items | Description | Dimension and Spec | Remark |
|-------|---|--|--|
| / | *Minimal Capacity ("C _{min} ") | 3820mAh | 同 PS 中的 item 4.5 |
| / | *Initial Impedance | 50mohm Max | 同 PS 中的 item 5.1.4 |
| / | *Cell Voltage | 3.74~3.795V (20%~30% SOC) | 同 PS 中的 item 5.1.5 |
| / | Side folding type | Double folding | Single folding/Double folding/No folding |
| / | Sealant type | Hard sealant | Soft sealant/Hard sealant |
| T | Cell Thickness (Fresh) | 4.12~4.52mm | Measured by 1400g PPG |
| | Cell thickness (Cycled) | 4.88mm max after cycling specified in Item 5.1.2 | |
| W | Cell Width | 59.0~60.0mm | Measured by caliper |
| L | Cell Length | 78.3~79.5mm | Measured by caliper |
| A | Total length | 87.0mm Min | |
| C | Tab width | 5.0 ± 0.1 mm | |
| | Tab thickness | 0.08 ± 0.03mm | |
| D | Top sealing | 2.5 ± 0.5mm | |
| E | Sealant exposure length | 0.2 ~2.0mm | |
| F1 | +Tab position | 12.0 ± 1.0 mm | |
| F2 | -Tab position | 45.0 ± 1.0 mm | |
| H1 | Terrace height | 2.9mm Min | |



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| | | | |
|----|---------------------------|-------------------------|--|
| H2 | Back Step | 0.2mm Min | |
| R1 | R corner(barcode surface) | 1.0mm Min | |
| R2 | R corner(bottom surface) | 0.5mm Min for reference | |



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7 Appendix Handling Precautions and Guidelines for LIP Rechargeable Batteries:

Foreword: These Handling Precautions and Guidelines for LIP Rechargeable Batteries shall apply to the Product.

Statement 1): Customer is requested to contact ATL in advance, if and when the customer needs other applications or operating conditions than those described in this document. Additional experimentation may be required to verify performance and safety under such conditions.

Statement 2): ATL will take no responsibility for any accident when the Product is used under other conditions than those described in this Document.

7.1 Charge:

7.1.1 Charge Current:

Charge current should be less than the maximum value specified in the Detailed Specifications. Charging with higher current than recommended value may cause damage to Cell's electrical, mechanical and safety performance and could lead to heat generation or leakage.

7.1.2 Charge Voltage:

Charging shall be done by voltage less than that specified in the Detailed Specifications. Charging beyond 4.5V, which is the absolute maximum voltage, must be strictly prohibited. The charger and protection circuit of battery pack shall be designed to comply with this condition. It is very dangerous that charging with higher voltage than the maximum value and may cause damage to the Cell's electrical, mechanical safety performance and could lead to heat generation or leakage.

7.1.3 Charge Temperature:

Cells shall be charged according to the Temperature Condition specified in the Detailed Specifications. Charging at subzero temperature shall be prohibited.

7.1.4 Prohibition of Charge to multi Cells under 2.0V and single cell under 1.0V:

It is prohibited to charge the Cells over above.

7.1.5 Prohibition of Reverse Charge:

Reverse charge is prohibited. Cells shall be connected correctly. The polarity has to be confirmed before wiring. If a Cell is connected improperly, the Cell cannot be charged. Simultaneously, the reverse charging may cause damage to the Cell which may lead to degradation of cell performance and damage the cell safety, and could cause heat generation or leakage.

7.2 Discharge:

7.2.1 Discharge Current:

The cells shall be discharged at less than the maximum discharge current specified in the Detailed Specifications. High discharging current may reduce the discharge capacity significantly or cause over-heat.

7.2.2 Discharge Temperature:

Cells shall be discharged according to the Temperature Condition specified in the Detailed Specifications.

7.2.3 Over-discharge:

It should be noted that cells would be at an over-discharged status due to self-discharge characteristics in case they were not used for a long time. In order to prevent over-discharging, Cells shall be charged periodically to maintain the voltage between 3.6V and 3.95V. Over-discharging may cause the loss of cell performance, characteristics, or battery functions.

7.3 Protection Function Requirements for Battery and Host Device:

Battery pack and host device shall be designed with below protection function to make sure that the Cells would be under safe usage conditions: Over-charge protection; Over-discharge protection ;Over current protection; Over-heat protection; Short circuit protection.

7.3.1 Overcharge Protection:



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Overcharge protection function shall be triggered and stop charging if any one of the Cells of a battery pack reaches 4.5V. The host device and battery pack shall be designed to indefinitely withstand the maximum voltage from the adapter, under a single fault condition, to prevent a cascading failure through the system to the battery pack and/or Cell.

7.3.2 Over-discharge Protection:

When the voltage of any cell in a battery pack is lower than 2.5V, over-discharge protection function shall work and stop discharging to prevent the Cells from over-discharge. It is recommended that the dissipation current of PCM shall be less than 1.0uA. The voltage of each cell in a battery pack shall be monitored and current shall be controlled by the PCM all the time.

7.3.3 Over Current Protection:

In case of charge current is over the limitation specified in Detailed Specifications, the charging must be cut off. The battery pack shall have at least one over current protection circuitry or devices designed to meet the specification to avoid the Cell is charged with greater current than Detailed Specifications.

The host device shall be designed to indefinitely withstand the maximum current from the adapter, under a single fault condition, to prevent a cascading failure through the system to the battery pack and/or Cell.

7.3.4 The Requirements to the Components of Protection Circuit:

Cells, components, and materials used in the battery pack shall meet the minimum and maximum temperature requirements with adequate margin. Protection circuit components (excluding thermal devices designed to activate at specific temperatures) shall be rated for a minimum operating range of -25°C to $+85^{\circ}\text{C}$.

7.3.5 Over Temperature Protection:

The battery pack or host device shall contain at least one thermal protection device or mechanism independent of internal cell devices or mechanisms. For a thermistor type temperature protection circuit, all packs of the same model shall have the same voltage to temperature translation (acceptable tolerance no more than $\pm 10\%$), with consideration for any temperature lag over time.

During charge and discharge, the temperature of the Cell shall be monitored. When temperature limitations are exceeded, action shall be taken to mitigate hazards. Action should include shutdown, or disabling of charging, or other protective action. The action may be taken by the battery pack and/or host.

7.3.6 The Limitation of Charge Time:

In order to prevent abnormal Cells or battery packs, charge time shall be limited according to the Detailed Specifications. When time limitations are exceeded, action shall be taken by the host device or the battery pack to shutdown or disable the charging.

7.3.7 Pre-charge Function:

The system shall not initiate normal charging if the battery voltage is below the over-discharge protection voltage defined in the Detailed Specifications. In this case, the system may support a pre-charging function to bring the battery voltage above the required threshold. The recommended pre-charge procedure is as below:

The cell battery pack charging shall start with a low current ($\leq 0.1C_{\min}$ mA) for approximately 30 minutes before rapid charging starts. The rapid charging shall be started after the (individual) cell voltage has been reached above 3V within approximately 30 minutes that can be determined with the use of an appropriate timer for pre-charging. In case the (individual) cell voltage does not rise to 3V within the pre-charging time, then the charger shall have functions to stop further charging and display the cell/pack is at abnormal state.

7.3.8 The Other Requirements to Main Device Designation:

- 1) In case of fault happened in host device, it shall not disable the safety features inside the battery pack(s).
- 2) The charging system, or any part of the host device, shall not disable or override the safety features inside the battery pack(s).



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7.4 Notice for Designing Battery Pack:

7.4.1 Pack Design:

- 1) Battery pack should have sufficient strength to make sure the Cell inside is protected from mechanical shock..
- 2) No sharp edge components should be inside the pack containing the battery Cells.
- 3) Allowances shall be made for cell and battery pack dimensional tolerance and changes throughout the product lifetime.

7.4.2 Avoid any components or conductive plate from devices to contact the edge of packing foil of the Cell.



Any components contacting these two edges must be insulated.

7.4.3 Tab Connection:

- 1) Ultrasonic welding, laser welding or spot welding is recommended to connect Cells with PCM or other parts.
- 2) Manual soldering method is not allowed.

7.4.4 Cell Fixing:

- 1) The Cell should be fixed to the battery pack or host device on its largest surface area.
- 2) Movement of Cell in the battery pack should not be allowed.
- 3) Short circuit of Cell in a battery pack or host device should not be allowed: Enough insulation layers between wiring and the Cell shall be used to maintain extra safety protection. The battery pack or host device shall be structured without any potential short circuit, which may cause generation of smoke or firing.

7.5 Storage:

The Cell shall be stored at the Temperature Condition and the Humidity Condition specified in the Detailed Specifications at all times. The voltage for a long time (Over 3 months) storage shall be 3.6V to 3.95V range.

7.6 Handling of Cells:

Since Cells are packed in soft material, to ensure its better performance, careful handling is very important.



7.6.1 Soft Aluminium Foil: The soft aluminum packing foil may be damaged by sharp matter such as Ni-tabs, pins and needles or other tooling and fixtures.

- 1) Do not strike Cells with any sharp matter.
- 2) Trim your nail or wear gloves before taking Cells.
- 3) Clean worktable to make sure that there is no sharp particle.



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7.6.2 Top Sealing Edge: Sealing edge on the top of the Cell is very flimsy and easy to be delaminated. Do not bend or fold this area.



7.6.3 Side Sealing Edge: The side sealing edge has been folded and fixed in cell forming processes and passed hermetic test. The Aluminum foil may brake by re-folding time after time. Don't open and refold this edge.



7.6.4 Tabs: The Cell tabs are easy to be broken especially for Aluminum tab. Do not bend the tabs.



7.6.5 Mechanical Shock: Do not drop, shock or bend Cell body.

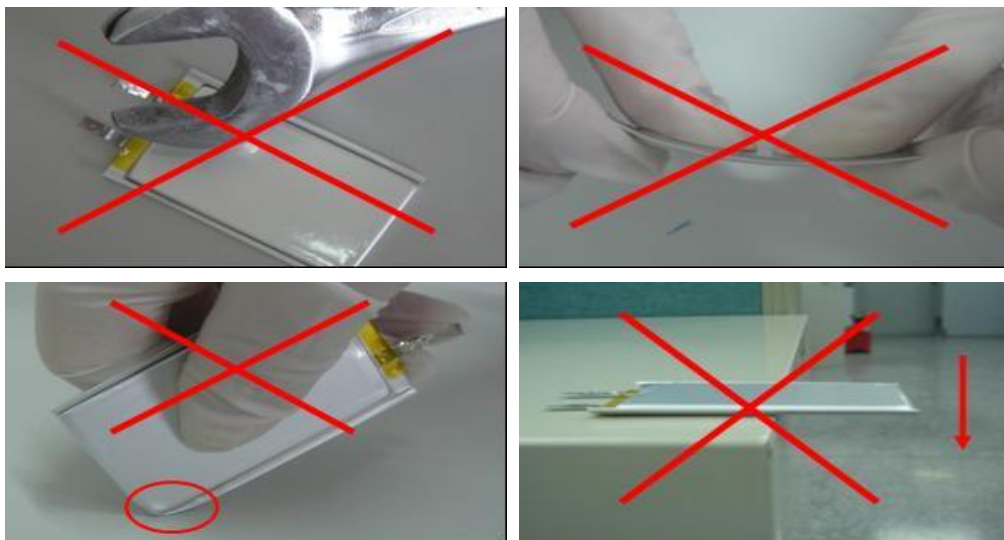


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7.6.6 Short: Short terminal of the Cell is strictly prohibited. It may damage the Cell and result in safety accident.



7.7 User's Guideline for Safety Handling:

7.7.1 The following information, or equivalent statements, shall be made available to the Customer's users of battery with the Cells incorporated inside through one or more of the following means, as appropriate: printed on the label for the battery, printed on the label for host device, printed in the owner's manual, or posted in a help file or Internet website:

- 1) Do not disassemble or open, crush, bend or deform, puncture, or shred.
- 2) Do not modify or remanufacture, attempt to insert foreign objects into the battery, immerse or expose to water or other liquids, or expose to fire, explosion, or other hazard.
- 3) Only use the battery for the system for which it was specified.
- 4) Only use the battery with a charging system that has been qualified with the system per standard. Use of an unqualified battery or charger may present a risk of fire, explosion, leakage, or other hazard.
- 5) Do not short circuit a battery or allow metallic or conductive objects to contact the battery terminals.
- 6) Replace the battery only with another battery that has been qualified with the system per standard. Use of an unqualified battery may present a risk of fire, explosion, leakage, or other hazard.
- 7) Do not keep a battery at rest for a long time (over 6 months). Safety accident may happen when re-charging a battery which has a rest for a long time.
- 8) Promptly dispose of used batteries in accordance with applicable local regulations.
- 9) Battery usage by children should be supervised.
- 10) Avoid dropping the device or battery. If the device or battery is dropped, especially on a hard surface, and the user suspects damage, take it to a service center for inspection.



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- 11) Improper battery use may result in a fire, explosion, or other hazard.
- 12) In the event of a battery leak, do not allow the liquid to come in contact with the skin or eyes. If contact has been made, wash the affected area with large amounts of water and seek medical advice.

13) Seek medical advice immediately if a battery has been swallowed.

14) Communicate the appropriate steps to be taken if a hazard occurs.

7.7.2 The following indications, notifications, and dialog/messages, at the system level, or an equivalent statement, may be displayed along with recommended actions as appropriate:

- 1) Abnormal battery temperature alert.
- 2) Abnormal host device and/or battery dc input voltage alert.
- 3) Abnormal current draw alert.
- 4) Battery communication fail/time-out alert.
- 5) Incompatible battery alert.
- 6) Alert for other malfunctions that may lead to hazards.

7.8 Others:

7.8.1 Prohibition of Disassembly:

- 1) Never disassemble the Cell. The disassembling may generate internal short circuit in the Cell, which may cause swelling, firing, or other problems.
- 2) Electrolyte is harmful. LIP battery should not have liquid from electrolyte flowing, but in case the electrolyte come into contact with the skin, or eyes, physicians shall flush the electrolyte immediately with fresh water and medical advice is to be sought.

7.8.2 Never incinerate nor dispose the Cell in fire. This may cause firing of the Cell, which is very dangerous.

7.8.3 The Cell shall never be soaked with liquids such as water, seawater, or drinks such as soft drinks, juices, coffee or other beverages.

7.8.4 The battery replacement shall be done only by either Cell supplier or device supplier and never be done by the user.

7.8.5 Prohibition of use of damaged Cell:

The Cell might be damaged during shipping by shock. If any abnormal features of the Cell are found such as damages in a plastic envelop of the Cell, deformation of the Cell package, smelling of an electrolyte, an electrolyte leakage and others, the Cell shall never be used any more. The Cell with a smell of the electrolyte or a leakage shall be placed away from fire to avoid firing.