



益阳市中钰科技电子有限公司

YIYANG HOWLET TECHNOLOGY ELECTRONIC CO.,LTD

# 产品承认书

## SPECIFICATION FOR APPROVAL

客户名称 (CUSTOMER) : 立创

产品名称 (PROD. NAME) : 环保铝电解电容器

规格型号 (SPEC. ) : CD11G L 系列/6000H/环保

日期 (DATE) : 2022/02/28

客户接收 (CUSTOMER) :

| 接收人 (RECEIVER) : | 检验人 (TESTER) : | 审核 (APPROVED) : |
|------------------|----------------|-----------------|
|                  |                |                 |

供应商 (VENDOR) :

| 拟制 (DRAWN) : | 审核 (CHECK) : | 批准 (APPROVED) : |
|--------------|--------------|-----------------|
| 胡且力          |              | 付欣              |

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**变 更 履 历 表**

|        |  |        |        |            |
|--------|--|--------|--------|------------|
| 顾客物料名称 |  | 中钰物料名称 | 铝电解电容器 | 日 期        |
| 顾客型号规格 |  | 中钰型号规格 | CD11GL | 2022/02/28 |

| 项 目 | 日 期        | 版 本 | 变更原因 | 描 述   |
|-----|------------|-----|------|-------|
| 1   | 2022/02/28 |     |      | 第一次承认 |
| 2   |            |     |      |       |
| 3   |            |     |      |       |
| 4   |            |     |      |       |
| 5   |            |     |      |       |
| 6   |            |     |      |       |
| 7   |            |     |      |       |
| 8   |            |     |      |       |
| 修 改 |            |     |      |       |
| 审 核 |            |     |      |       |
| 批 准 |            |     |      |       |

|                               |                |                               |                |           |             |            |
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| <b>STANDARD MANUAL</b>        |                |                               |                |           |             |            |

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## 承 认 规 格

| 序号 | 客户料号     | 中钰型号规格           | 中钰料号                   | 尺寸      | 备注          |
|----|----------|------------------|------------------------|---------|-------------|
| 01 | C2975996 | 1uF ±20% 400V    | 3. GL. 2G1R0M0609T8899 | 6.3×9mm | HOWLET (中钰) |
| 02 | C2975995 | 33uF ±20% 250V   | 3. GL. 2E330M1320T8899 | 13×20mm | HOWLET (中钰) |
| 03 | C2975994 | 4. 7uF ±20% 250V | 3. GL. 2E4R7M0811TN199 | 8×11    | HOWLET (中钰) |
| 04 | C2975993 | 2. 2uF ±20% 250V | 3. GL. 2E2R2M0612TN199 | 6.3×12  | HOWLET (中钰) |
| 05 | C2975992 | 1uF ±20% 250V    | 3. GL. 2E1R0M0610TQC00 | 6.3×10  | HOWLET (中钰) |
| 06 | C2975998 | 2. 2uF ±20% 400V | 3. GL. 2G2R2M0609TN1G3 | 6.3×12  | HOWLET (中钰) |
| 07 | C2975990 | 22uF ±20% 160V   | 3. GL. 2C220M0812T8899 | 8×12    | HOWLET (中钰) |
| 08 | C2975989 | 10uF ±20% 160V   | 3. GL. 2C100M0612T8899 | 6.3×12  | HOWLET (中钰) |
| 09 | C2976006 | 6. 8uF ±20% 400V | 3. GL. 2G6R8M1013T8899 | 10×13   | HOWLET (中钰) |
| 10 | C2976005 | 6. 8uF ±20% 400V | 3. GL. 2G6R8M0814TQQ03 | 8×14    | HOWLET (中钰) |
| 11 | C2976004 | 6. 8uF ±20% 400V | 3. GL. 2G6R8M0812TQC00 | 8×12    | HOWLET (中钰) |
| 12 | C2975997 | 2. 2uF ±20% 400V | 3. GL. 2G2R2M0609TN199 | 6.3×9   | HOWLET (中钰) |
| 13 | C2976002 | 4. 7uF ±20% 400V | 3. GL. 2G4R7M0812TF499 | 8×12    | HOWLET (中钰) |
| 14 | C2976001 | 3. 3uF ±20% 400V | 3.GL.2G3R3M0816CT399   | 8×16    | HOWLET (中钰) |

|                               |                |                               |                |           |             |            |
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## 承 认 规 格

| 序号 | 客户料号     | 中钰型号规格          | 中钰料号                   | 尺寸    | 备注          |
|----|----------|-----------------|------------------------|-------|-------------|
| 15 | C2976000 | 3.3uF ±20% 400V | 3. GL. 2G3R3M0812TQQ03 | 8×12  | HOWLET (中钰) |
| 16 | C2975999 | 3.3uF ±20% 400V | 3. GL. 2G3R3M0812TQC00 | 8×12  | HOWLET (中钰) |
| 17 | C2976010 | 15uF ±20% 400V  | 3. GL. 2G150M1020CT399 | 10×20 | HOWLET (中钰) |
| 18 | C2975991 | 68uF ±20% 200V  | 3. GL. 2D680M1025TC00  | 10×25 | HOWLET (中钰) |
| 19 | C2976003 | 5.6uF ±20% 400V | 3. GL. 2W5R6M8B14TP699 | 8×14  | HOWLET (中钰) |
| 20 | C2976009 | 10uF ±20% 400V  | 3. GL. 2G100M1016CT399 | 10×16 | HOWLET (中钰) |
| 21 | C2976008 | 8.2uF ±20% 400V | 3. GL. 2G8R2M1013T8899 | 10×13 | HOWLET (中钰) |
| 22 | C2976007 | 6.8uF ±20% 400V | 3. GL. 2G6R8M1013CT399 | 10×13 | HOWLET (中钰) |
| 23 | C2976012 | 22uF ±20% 400V  | 3. GL. 2G220M1220CT399 | 12×20 | HOWLET (中钰) |
| 24 | C2976011 | 22uF ±20% 400V  | 3. GL. 2G220M1220TN199 | 12×20 | HOWLET (中钰) |
| 25 | C2976013 | 10uF ±20% 450V  | 3. GL. 2W100M1016TN199 | 10×16 | HOWLET (中钰) |
| 26 |          |                 |                        | ×     | HOWLET (中钰) |
|    |          |                 |                        |       |             |
|    |          |                 |                        |       |             |

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| Customer | SERIES | CD11GL | DATE | 2022/02/28 |
|----------|--------|--------|------|------------|

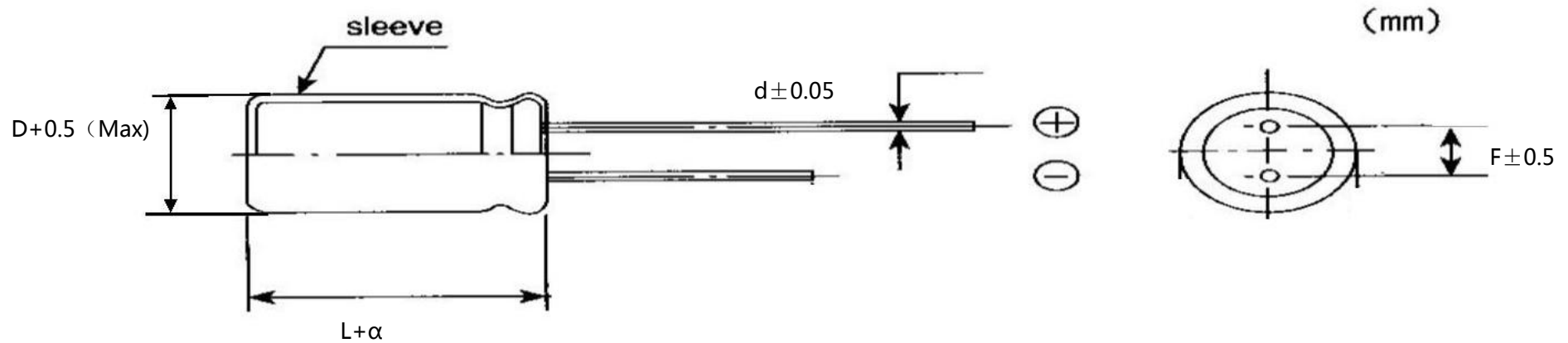


TABLE-1

| No. | Customer Part No. | Howlet Part No.        | Capacitance (μF) | Tolerance on Rated Capacitance (%) | Rated Voltage (Vdc) | Surge Voltage (Vdc) | Operating Temp. Range (°C) | tanδ (120Hz) (Max) | Leakage Current (μA) (2min.) | Max Ripple Current (mArms) at 105°C 100kHz | Endurance at 105°C (Hours) | Dimensions (mm) |    |   |     |     | Appearance Drawing No. |    |
|-----|-------------------|------------------------|------------------|------------------------------------|---------------------|---------------------|----------------------------|--------------------|------------------------------|--|----------------------------|-----------------|----|---|-----|-----|------------------------|----|
|     |                   |                        |                  |                                    |                     |                     |                            |                    |                              |  |                            | ΦD              | L  | α | d   | F   |                        | F1 |
| 1   | C2975996          | 3. GL. 2G1R0M0609T8899 | 1.0              | ±20                                | 400                 | 450                 | 105                        | 0.10               | 12                           | 59   | 6000                       | 6.3             | 9  | 2 | 0.5 | 2.6 | /                      |    |
| 2   | C2975995          | 3. GL. 2E330M1320T8899 | 33               | ±20                                | 250                 | 300                 | 105                        | 0.10               | 247.5                        | 535  | 6000                       | 13              | 20 | 2 | 0.6 | 5.3 |                        |    |

|                               |                |                               |                |           |             |
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| No.         | Customer Part No. | Howlet Part No.        | Capacitance (μF) | Tolerance on Rated Capacitance (%) | Rated Voltage (Vdc) | Surge Voltage (Vdc) | Operating Temp. Range (°C) | tanδ (120Hz) (Max) | Leakage Current (μA) (2min.) | Max Ripple Current (mArms) at 105°C 100kHz | Endurance at 105°C (Hours) | Dimensions (mm) |    |   |     |     |    | Appearance Drawing No. |
|             |                   |                        |                  |                                    |                     |                     |                            |                    |                              |  |                            | ΦD              | L  | α | d   | F   | F1 |                        |
| 3           | C2975994          | 3. GL. 2E4R7M0811TN199 | 4.7              | ±20                                | 250                 | 300                 | 105                        | 0.10               | 32.25                        | 102  | 6000                       | 8               | 12 | 2 | 0.5 | 3.5 | /  |                        |
| 4           | C2975993          | 3. GL. 2E2R2M0612TN199 | 2.2              | ±20                                | 250                 | 300                 | 105                        | 0.10               | 16.5                         | 75   | 6000                       | 6.3             | 12 | 2 | 0.5 | 2.6 |    |                        |
| 5           | C2975992          | 3. GL. 2E1R0M0610TQC00 | 1                | ±20                                | 250                 | 300                 | 105                        | 0.10               | 12.5                         | 46   | 6000                       | 6.3             | 10 | 2 | 0.5 | 2.6 |    |                        |
| 6           | C2975998          | 3. GL. 2G2R2M0609TN1G3 | 2.2              | ±20                                | 400                 | 450                 | 105                        | 0.10               | 9.4                          | 78   | 6000                       | 6.3             | 12 | 2 | 0.5 | 2.6 |    |                        |
| 7           | C2975990          | 3. GL. 2C220M0812T8899 | 22               | ±20                                | 160                 | 200                 | 105                        | 0.10               | 105.6                        | 320  | 6000                       | 8               | 12 | 2 | 0.5 | 3.5 |    |                        |
| 8           | C2975989          | 3. GL. 2C100M0612T8899 | 10               | ±20                                | 160                 | 200                 | 105                        | 0.10               | 48                           | 180  | 6000                       | 6.3             | 12 | 2 | 0.5 | 2.6 |    |                        |
| 9           | C2976006          | 3. GL. 2G6R8M1013T8899 | 6.8              | ±20                                | 400                 | 450                 | 105                        | 0.10               | 81.6                         | 145  | 6000                       | 10              | 13 | 2 | 0.6 | 5.3 |    |                        |
| 10          | C2976005          | 3. GL. 2G6R8M0814TQQ03 | 6.8              | ±20                                | 400                 | 450                 | 105                        | 0.10               | 81.6                         | 128  | 6000                       | 8               | 14 | 2 | 0.5 | 3.5 |    |                        |
| 11          | C2976004          | 3. GL. 2G6R8M0812TQC00 | 6.8              | ±20                                | 400                 | 450                 | 105                        | 0.10               | 81.6                         | 128  | 6000                       | 8               | 12 | 2 | 0.5 | 3.5 |    |                        |
| 12          | C2975997          | 3. GL. 2G2R2M0609TN199 | 2.2              | ±20                                | 400                 | 450                 | 105                        | 0.10               | 9.6                          | 72   | 6000                       | 6.3             | 9  | 2 | 0.5 | 2.6 |    |                        |
| 13          | C2976002          | 3. GL. 2G4R7M0812TF499 | 4.7              | ±20                                | 400                 | 450                 | 105                        | 0.10               | 56.4                         | 104  | 6000                       | 8               | 12 | 2 | 0.5 | 3.5 |    |                        |

|                        |  |         |  |                        |         |    |      |     |
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| No.         | Customer Part No. | Howlet Part No.        | Capacitance (μF) | Tolerance on Rated Capacitance (%) | Rated Voltage (Vdc) | Surge Voltage (Vdc) | Operating Temp. Range (°C) | tanδ (120Hz) (Max) | Leakage Current (μA) (2min.) | Max Ripple Current (mArms) at 105°C 100kHz | Endurance at 105°C (Hours) | Dimensions (mm) |    |   |     |     |    | Appearance Drawing No. |
|             |                   |                        |                  |                                    |                     |                     |                            |                    |                              |  |                            | ΦD              | L  | α | d   | F   | F1 |                        |
| 14          | C2976001          | 3. GL. 2G3R3M0816CT399 | 3.3              | ±20                                | 400                 | 450                 | 105                        | 0.10               | 39.6                         | 91   | 6000                       | 8               | 16 | 2 | 0.5 | 3.5 | /  |                        |
| 15          | C2976000          | 3. GL. 2G3R3M0812TQQ03 | 3.3              | ±20                                | 400                 | 450                 | 105                        | 0.10               | 39.6                         | 91   | 6000                       | 8               | 12 | 2 | 0.5 | 3.5 |    |                        |
| 16          | C2975999          | 3. GL. 2G3R3M0812TQC00 | 3.3              | ±20                                | 400                 | 450                 | 105                        | 0.10               | 39.6                         | 91   | 6000                       | 8               | 12 | 2 | 0.5 | 3.5 |    |                        |
| 17          | C2976010          | 3. GL. 2G150M1020CT399 | 15               | ±20                                | 400                 | 450                 | 105                        | 0.10               | 180                          | 274  | 6000                       | 10              | 20 | 2 | 0.6 | 5.3 |    |                        |
| 18          | C2975991          | 3. GL. 2D680M1025TC00  | 68               | ±20                                | 200                 | 250                 | 105                        | 0.10               | 408                          | 580  | 6000                       | 10              | 25 | 2 | 0.6 | 5.3 |    |                        |
| 19          | C2976003          | 3. GL. 2W5R6M8B14TP699 | 5.6              | ±20                                | 400                 | 450                 | 105                        | 0.10               | 67.2                         | 125  | 6000                       | 8               | 14 | 2 | 0.5 | 3.5 |    |                        |
| 20          | C2976009          | 3. GL. 2G100M1016CT399 | 10               | ±20                                | 400                 | 450                 | 105                        | 0.10               | 120                          | 226  | 6000                       | 10              | 16 | 2 | 0.6 | 5.3 |    |                        |
| 21          | C2976008          | 3. GL. 2G8R2M1013T8899 | 8.2              | ±20                                | 400                 | 450                 | 105                        | 0.10               | 98.4                         | 208  | 6000                       | 10              | 13 | 2 | 0.6 | 5.3 |    |                        |
| 22          | C2976007          | 3. GL. 2G6R8M1013CT399 | 6.8              | ±20                                | 400                 | 450                 | 105                        | 0.10               | 81.6                         | 145  | 6000                       | 10              | 13 | 2 | 0.6 | 5.3 |    |                        |
| 23          | C2976012          | 3. GL. 2G220M1220CT399 | 22               | ±20                                | 400                 | 450                 | 105                        | 0.10               | 264                          | 350  | 6000                       | 12              | 20 | 2 | 0.6 | 5.3 |    |                        |
| 24          | C2976011          | 3. GL. 2G220M1220TN199 | 22               | ±20                                | 400                 | 450                 | 105                        | 0.10               | 264                          | 350  | 6000                       | 12              | 20 | 2 | 0.6 | 5.3 |    |                        |
| 25          | C2976013          | 3. GL. 2W100M1016TN199 | 10               | ±20                                | 450                 | 500                 | 105                        | 0.10               | 135                          | 208  | 6000                       | 10              | 16 | 2 | 0.6 | 5.3 |    |                        |

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**1、概述 SCOPE**  
 本承认书规定了 CD11GL 系列径向引线引出铝电解电容器的技术规范。  
**This specification covers “CD11GL series” radial type aluminum electrolytic capacitors.**

**2、参考标准 APPLICABLE SPECIFICATION**  
 本承认书参考 GB/T2693 和 GB/T18504 制定。  
**This approval sheet consulted the institute of GB/T2693 and GB/T18504**

**3、工作温度范围 OPERATING TEMPERATURE RANGE**  
 工作温度范围是电容器在施加额定工作电压条件下，可以长期可靠工作的环境温度范围。  
**-40~+105℃(140~450V)**  
**Operating temperature range is the range of ambient temperature at which the capacitor can be operated continuously at rated voltage.**  
**-40~+105℃(140~450V)**

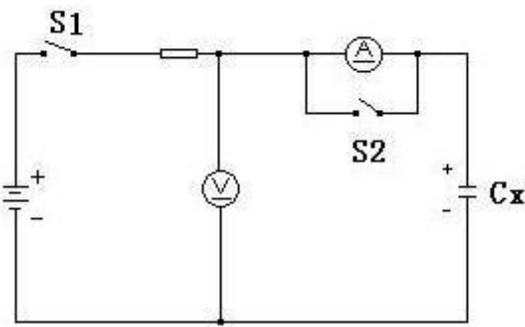
**4、测试环境 ATMOSPHERIC CONDITION OF MEASUREMENTS:**  
 如果没有其他规定，标准的测试、检验环境条件如下所示：  
 环境温度：15 至 35℃  
 相对湿度：45 至 75%  
 大气压力：86kpa 至 106kpa  
 如果对测试结果有异议，可以在以下条件测试：  
 环境温度：25±2℃  
 相对湿度：60 至 70%  
 大气压力：86kpa 至 106kpa  
**Unless otherwise specified, the standard range of atmospheric conditions for making Measurements and tests are as follows**  
**Ambient temperature :15 to 35℃**  
**Relative humidity : 45 to 75%**  
**Air pressure : 86kpa to 106kpa**  
**If there may be doubt on the results, measurements shall be made within the following limits.**  
**Ambient temperature :25 ±2℃**  
**Relative humidity : 60 to 70%**  
**Air pressure : 86kpa to 106kpa**

|                        |         |                        |         |    |      |
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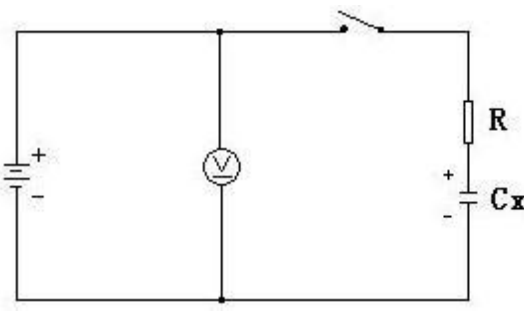
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**5.1 电气特性 ELECTRICAL CHARACTERISTICS**

| 序号<br>NO | 项目<br>Item                   | 测试方法<br>Test method  | 性能<br>Performance  |
|----------|------------------------------|--|--|
| 5.1.1    | 额定工作电压<br>Rated voltage      |  | DC160~450v   |
| 5.1.2    | 电容量<br>Capacitance           | 测试频率:120HZ±10%<br>测试电路:串联等效<br>测试电压:0.5Vrms 以下<br>Measuring frequency : 120HZ±10%<br>Measuring circuit:<br>Series equivalent circuit<br>Measuring voltage:<br>0.5Vrms or less +1.5 to 2.0 VDC  | 1~100 μ F<br>容量偏差:<br>CD11GL:-20%+20%<br><br>Capacitance tolerance:<br>CD11GL:-20%+20%   |
| 5.1.3    | 损耗角正切值<br>Dissipation Factor | 测试条件与 5.1.2 电容量测试相同<br>Testing condition are the same as 5.1.2 for capacitance   | tg δ ≤0.10   |
| 5.1.4    | 漏电流<br>Leakage current       | 在电容器两端施加额定工作电压后,并串联 1000±100 Ω 电阻,在施加电压 1 分钟后,测量漏电流。<br>测试电路如下图:<br><br>The rated voltage shall be applied across the capacitor and<br>Its protective resistor which shall be 1000±100 Ω .The leakage current shall then be measured after an electrification period of 1 min..<br><br> | 电压(160~450V)<br>CD11GL:1 分钟后<br>Ic ≤0.1CV+40 μ A (CV ≤1000)<br>Ic ≤0.04CV+100 μ A (CV ≥1000)<br><br>Ic: 漏电流(μ A)<br>C:容量(μ F)<br>V:额定工作电压(V)<br><br>Voltage(160~450V)<br>CD11GL:Not more than<br>Ic ≤0.1CV+40 μ A (CV ≤1000)<br>Ic ≤0.04CV+100 μ A (CV ≥1000)<br><br>Ic:Leakage current(μ A)<br>C:Capacitance(μ F)<br>V:Rated voltage(V) |

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| 5.1.5 | <b>温度特性</b><br><b>Temperature Characteristic</b> | <table border="1" data-bbox="526 369 1005 571"> <thead> <tr> <th>阶段</th> <th>温度</th> <th>时间</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>20±2℃</td> <td>--</td> </tr> <tr> <td>2</td> <td>+0<br/>-25-3℃</td> <td>2h</td> </tr> <tr> <td>3</td> <td>+3<br/>105-0℃</td> <td>2h</td> </tr> </tbody> </table> <p>阶段 1:测量容量和阻抗<br/>(<math>iZ</math> 20℃ 120HZ±20%)</p> <p>阶段 2:电容器恒温贮存 2 小时,在热平衡状态测阻抗<br/>(<math>iZ</math> -25℃ 120HZ±20%)</p> <p>阶段 3:电容器恒温贮存 2 小时,在热平衡状态测电容量</p> <p>Step1:Capacitance and impedance shall be measured.<br/>(<math>iZ</math> 20℃ 120HZ±20%)</p> <p>Step2:After the capacitor being stored for 2 hours,impedance shall be made at thermal stability. ( Z -25℃ 120HZ±20%)</p> <p>Step3: After the capacitor being stored for 2 hours,capacitance shall be measured. The measurement shall be made at thermal stability</p> | 阶段   | 温度 | 时间 | 1 | 20±2℃ | -- | 2 | +0<br>-25-3℃ | 2h | 3 | +3<br>105-0℃ | 2h | <p>阶段 2:<br/>阻抗值与阶段 1 阻抗值相比,不大于表 1 要求。</p> <p>阶段 3:<br/>容量变化应在初值的 ±20%范围内</p> <p>Step2:Impedance ratio<br/>Shall be not more<br/>Value give table-1</p> <p>Step3: Variation of<br/>capacitance<br/>Within ±20% of the value<br/>at Step 1.</p> |
|-------|--|---|--|----|----|---|-------|----|---|--------------|----|---|--------------|----|--|
| 阶段    | 温度   | 时间  |  |    |    |   |       |    |   |              |    |   |              |    |  |
| 1     | 20±2℃  | --  |  |    |    |   |       |    |   |              |    |   |              |    |  |
| 2     | +0<br>-25-3℃                                     | 2h  |  |    |    |   |       |    |   |              |    |   |              |    |  |
| 3     | +3<br>105-0℃                                     | 2h  |  |    |    |   |       |    |   |              |    |   |              |    |  |
| 5.1.6 | <b>耐浪涌电压</b><br><b>Surge</b>                     | <p>施加大 1 所列浪涌电压, 充电 30±5 秒, 放电 5.5±0.5 分钟作为一个周期, 共进行 1000 次。</p> <p>测试温度:15℃-35℃</p> <p>然后在标准大气条件下放置达到热稳定,测试各参数</p> <p>Application of DC surge Voltage stated at table-1,1000 times of charging for 30±5 sec ,with a period of 6±0.5 min..</p> <p>Test temperature: 15℃-35℃</p> <p>And the capacitor shall be stored under standard atmospheric conditions to obtain thermal stability, after which measurements shall be made.</p>    | <p>容量:不低于试验前的 80%<br/>损耗角正切值不大于 200%<br/>的表规定值。</p> <p>漏电流: 达到 5.1.4 要求</p> <p>Capacitance:<br/>Not less than 80% of the<br/>value before test.</p> <p>Dissipation factor:<br/>Not more 200% of the<br/>specified value in table-1</p> <p>Leakage current:<br/>To satisfy No.5.1.4</p> |    |    |   |       |    |   |              |    |   |              |    |  |

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**5.2 机械特性 MECHANICAL PERFORMANCE**

| 序号<br>NO | 项目<br>Item                      | 测试方法<br>Test method  | 特性<br>Performance   |     |     |     |     |      |     |    |  |    |       |     |     |     |     |      |     |    |  |    |  |
|----------|---------------------------------|--|---|-----|-----|-----|-----|------|-----|----|--|----|-------|-----|-----|-----|-----|------|-----|----|--|----|--|
| 5.2.1    | 端子强度<br>TERMINAL STRENGTH       | 端子抗拉强度:<br>沿电容器端子引线方向施加固定重力*1N<br>10 秒钟. <table border="1" style="margin: 5px 0;"> <tr> <td>引线直径Φ</td> <td>0.5</td> <td>0.6</td> <td>0.8</td> <td>1.0</td> </tr> <tr> <td>拉力 N</td> <td>5.0</td> <td colspan="2">10</td> <td>20</td> </tr> </table> 端子抗弯强度:<br>在电容器引线施加固定重力*2N,然后,将电容体弯折 90° 后回到原位。<br>上述过程在 5 秒内完成。 <table border="1" style="margin: 5px 0;"> <tr> <td>引线直径Φ</td> <td>0.5</td> <td>0.6</td> <td>0.8</td> <td>1.0</td> </tr> <tr> <td>拉力 N</td> <td>5.0</td> <td colspan="2">10</td> <td>20</td> </tr> </table> Tensile strength of termination:<br>A static load of* 1N shall be applied to the terminal in the axial direction and acting in a direction away from the body for 10 sec.<br>Bending strength of termination:<br>Hang the specified dead weight of*2N,then bent the body through 90° with<br>The same speed ,again return to the original position<br>Carry out this operation im about 5 sec. | 引线直径Φ   | 0.5 | 0.6 | 0.8 | 1.0 | 拉力 N | 5.0 | 10 |  | 20 | 引线直径Φ | 0.5 | 0.6 | 0.8 | 1.0 | 拉力 N | 5.0 | 10 |  | 20 | 测量电容器应无接触不良、开路或短路, 无可见机械损伤<br><br>When the capacitance is mdawured ,there shall bd no intermittent contacts,or open or short-circuiting.<br>There shall be no such mechanical damgement. |
| 引线直径Φ    | 0.5                             | 0.6  | 0.8   | 1.0 |     |     |     |      |     |    |  |    |       |     |     |     |     |      |     |    |  |    |  |
| 拉力 N     | 5.0                             | 10   |   | 20  |     |     |     |      |     |    |  |    |       |     |     |     |     |      |     |    |  |    |  |
| 引线直径Φ    | 0.5                             | 0.6  | 0.8   | 1.0 |     |     |     |      |     |    |  |    |       |     |     |     |     |      |     |    |  |    |  |
| 拉力 N     | 5.0                             | 10   |   | 20  |     |     |     |      |     |    |  |    |       |     |     |     |     |      |     |    |  |    |  |
| 5.2.2    | 振动试验<br>Resistance to Vibration | 依据 IEC60068-2-6 试验。<br>在 3 个互相垂直的方向分别施加 2 小时振动, 共 6 小时<br>To comply with IEC60068-2-6<br>Direction and duration of vibration:<br>3 orthogonal directions mutually each for 2h,Total 6h.  | 测量电容量应无接触不良开路或短路,无可见机械损伤。<br>When the capacitance is measured there shall be no intermittent contacts or open or short circuiting There shall be no such mechanical damage. |     |     |     |     |      |     |    |  |    |       |     |     |     |     |      |     |    |  |    |  |
| 5.2.3    | 可焊性<br>Solder ability           | 依据 IEC60068-2-2 进行试验<br>焊锡温度: 230±5℃<br>浸入时间: 2±0.5 秒<br>To comply with IEC60068-2-2<br>Temperature or solder:235±5℃<br>Dipping time: 2±0.5sec<br>This specification shall be met after the capacitors are stored under standard<br>Atmospheric conditions for 6 months.   | 浸入焊锡的引线表面积约 3/4 以上应附着新锡<br><br>At least 3/4f circumferential surface of the dipping portion of<br>Termination shall be covered with new solder.                             |     |     |     |     |      |     |    |  |    |       |     |     |     |     |      |     |    |  |    |  |

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### 5.3 特性测试 CHARACTERISTICS EXPERIMENT

| 序号<br>NO | 项目<br>Item                                     | 试验方法<br>Experiment method   | 特性<br>Performance   |
|----------|--|---|---|
| 5.3.1    | 耐焊接热   | 焊槽法：<br>焊锡温度：260±5℃<br>浸入时间：10±1秒<br>电路板：1.6MM<br>Solder bath method<br>Solder temperature: 260±5℃<br>Immersion time : 10±1sec<br>Printed wiring board: 1.6MM   | 容量变化:在初始值±10%范围内损耗角正切值:满足表1要求漏电流:满足 5.1.4 要求<br>外观:无异状<br>Variation of capacitance:<br>Within ± 10% of the value before test.<br>Dissipation factor:<br>To satisfy table 1.<br>Leakage current:<br>To satisfy No.5.1.4<br>Appearance:<br>No remarkable abnormality .  |
| 5.3.2    | 稳态湿热<br>Resistance to damp heat (steady state) | 依据 IEC60068-2-3 进行试验<br>试验温度：40±2℃<br>试验时间：240±8h<br>相对湿度：90~95%<br>试验后，电容器在标准大气条件下 1~2 小时，然后测试参数<br>To comply with IEC60068-2-3<br>Test temperature: 40±2℃<br>Test time : 240±8h<br>Relative humidity: 90~95%<br>After completion of test,the capacitor shall be subjected to standard atmospheric conditions for 1 to 2 hours,after which measurements shall be made. | 容量变化: 在初始值±15%范围内损耗角正切值: 满足表 1 要求,漏电流: 满足 5.1.4 要求<br>外观:无异状<br>Variation of capacitance:<br>Within ± 15% of the value before test.<br>Dissipation factor:<br>To satisfy Table 1.<br>Leakage current:<br>To satisfy No.5.1.4<br>Appearance:<br>No remarkable abnormality.   |
| 5.3.3    | 高温负荷试验<br>LIFE TEST                            | 1、试验温度：105±2℃施加额定电压和额定纹波电流<br>Application of the rated voltage and rated ripple current temperature:105±2℃<br><br>试验时间: CD11GL: 6000-0 <sup>+72</sup> h<br>Test temperature: 105±2℃<br>Test time:CD11GL: 6000-0 <sup>+72</sup> h  | 容量变化: 在初始值±20%范围内损耗角正切值: 满足表 1 所列规定值的 200%<br>漏电流: 满足 5.1.4 要求<br>外观:无异状<br>Variation of capacitance:<br>Within ± 20% of the value before test.<br>Dissipation factor:<br>Not more than 200% of the specified value in Table 1.<br>Leakage current:<br>To satisfy No.5.1.4<br>Appearance:<br>No remarkable abnormality. |

|                        |         |                        |         |    |      |   |
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| 序号<br>NO | 项目<br>Item                | 测试方法<br>Test method   | 特性<br>Performance   |
|----------|---------------------------|---|---|
| 5.3.4    | 高温贮存试验<br>SHELF LIFE TEST | 1、在 $105 \pm 2^\circ\text{C}$ 环境下无负荷贮存 $1000-0 \text{ h}$ ，至少恢复 $16 \text{ h}$ 。<br><br>The capacitors are then stored with no voltage at a temperature of $105 \pm 2^\circ\text{C}$ for $1000-0 \text{ h}$ and then resumed $16 \text{ h}$ .                                     | 容量变化: 初始值 $\pm 20\%$ 范围内。<br>损耗角正切值: 不超过表 1 所列规定值的 $200\%$<br>漏电流: 不超过 5.1.4 所规定值的 $200\%$<br>外观: 无异状<br>Variation of capacitance:<br>Within $\pm 30\%$ of the value before test.<br>Dissipation factor:<br>Not more than $200\%$ of the specified value in Table 1.<br>Leakage current:<br>Not more than $200\%$ of the specified value in 5.1.4 |
| 5.3.5    | 防爆试验<br>SAFETY VENT       | 在电容器两极施加反向工作电压，其中通过的电流应不大于 $1\text{A}$ ，在测试时防爆装置应能在 $30 \text{ min}$ 内动作。<br>D. C. Application test<br>The capacitor shall be subjected to a reverse D.C. voltage equal to the rated D.C. voltage.<br>The current flowing through the capacitor shall be limited to $1\text{A}$ . | 上述过程中应无引线, 铝箔等散射, 无火花产生。<br>The vent device is actuated under the test conditions, thereby preventing terminals, metal pieces, etc, of the capacitor from scattering due to burst, the case form separating from the seal packing, or the capacitor from producing flame.   |

表 1、(TABLOEI)

| 额定工作电压<br>Rated voltage(V) | 损耗角正切值<br>Dissipation factor*3 | 阻抗比  |
|----------------------------|--------------------------------|--|
|                            |                                | $Z_{f-25^\circ\text{C}}/Z_{f20^\circ\text{C}}$ |
| 160                        | 0.10                           | 3  |
| 200                        | 0.10                           | 3  |
| 250                        | 0.10                           | 3  |
| 350                        | 0.10                           | 6  |
| 400                        | 0.10                           | 6  |
| 450                        | 0.12                           | 6  |

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## 6、标记 MARKING

6.1 在电容器体上应注明如下内容:

- (1) 生产厂商商标
- (2) 工作电压
- (3) 型号规格
- (4) 负极标志
- (5) 额定温度

The following items shall be marked indelibly on the capacitor.

- (1) Manufacture's name or trade mark.
- (2) Rated voltage
- (3) Type and specification
- (4) Polarity of the terminals
- (5) Rated temperature

## 6.2 标记颜色

套管颜色:

CD11GL 中钽紫色

标记颜色:黑色

Marking color

Sleeve color:

CD11GL:HOWLET PURPLE

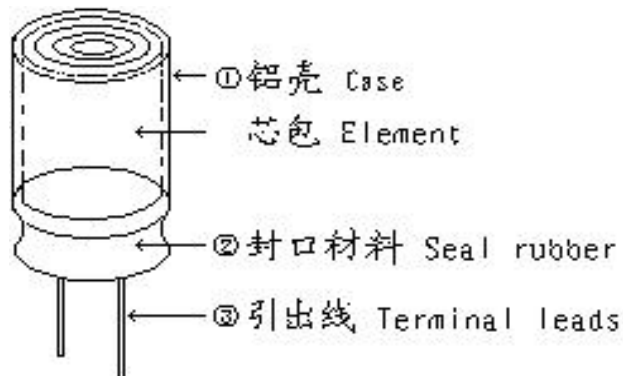
Marking color: Black

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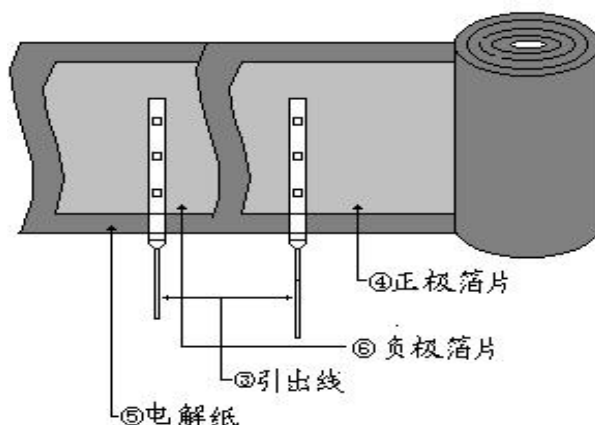
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## 7. 内部结构及材料表 Frame and material

### 7.1 构造图 Frame drawing



### 7.2 芯包分解图 Element drawing



### 7.3 材料表 Material Table

| NO | 构成部件 | 材质     | NO | 构成部件 | 材质        |
|----|------|--------|----|------|-----------|
| 1  | 铝壳   | 铝      | 6  | 负极箔  | 铝         |
| 2  | 橡胶塞  | 丁基胶    | 7  | 粘合剂  | 聚乙烯醇/电子胶带 |
| 3  | 引出线  | 铝+CP 线 | 8  | 电解液  | 有机溶液      |
| 4  | 正极箔  | 铝      | 9  | 套管   | PET       |
| 5  | 电解纸  | 纤维     |    |      |           |

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### 8、尺寸表、允许纹波电流 DIMENSIONS AND RIPPLE CURRENT

Case Size 外形尺寸: D (0~+1) × L(0~+2)(mm)      Ripple Current 纹波电流: (mA, 105°C/100KHZ)

(见前面 003-006 页)

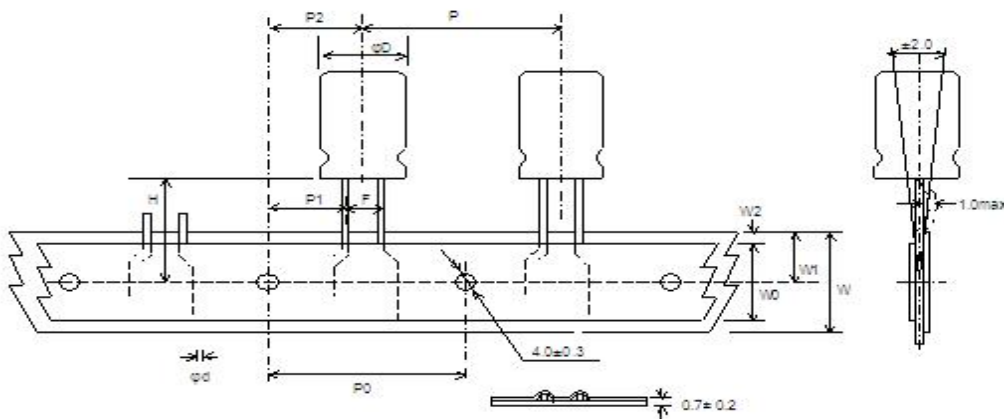
### 9、纹波电流频率因子 RIPPLE CURRENT FREQUENCY COEFFICIENT

| WV (V)  | 120HZ | 1KHZ | 10KHZ | 100KHZ |
|---------|-------|------|-------|--------|
| 160-450 | 0.50  | 0.80 | 0.90  | 1.00   |
|         |       |      |       |        |
|         |       |      |       |        |

### 10、加工型式 Forming Lead Type

**PIN Code : B**

ΦD=4~8



|                        |         |                        |         |    |      |   |
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**DIMENSIONS(mm)**

| Items                                   | Symbol    | CASE SIZE   |             |                |             |                | Tolerance   |
|---|-----------|-------------|-------------|----------------|-------------|----------------|-------------|
|   |           | 5x11        | 6.3x11      | 8x11           | 8x16        | 10x13          |             |
|   |           | 5x12        | 6.3x12      | 8x12           | 8x20        | 10x16<br>10x20 |             |
| Pin Code                                |           | <b>X</b>    | <b>B</b>    | <b>B</b>       | <b>B</b>    | <b>B</b>       |             |
| Lead wire diameter                      | $\Phi d$  | <b>0.5</b>  | <b>0.5</b>  | <b>0.4/0.5</b> | <b>0.6</b>  | <b>0.6</b>     | $\pm 0.05$  |
| Pitch of body                           | <b>P</b>  | <b>12.7</b> | <b>12.7</b> | <b>12.7</b>    | <b>12.7</b> | <b>12.7</b>    | $\pm 1.0$   |
| Feed hole pitch                         | <b>P0</b> | <b>12.7</b> | <b>12.7</b> | <b>12.7</b>    | <b>12.7</b> | <b>12.7</b>    | $\pm 0.2$   |
| Hole center to lead distance            | <b>P1</b> | <b>5.1</b>  | <b>5.35</b> | <b>5.1</b>     | <b>4.6</b>  | <b>4.6</b>     | $\pm 0.7$   |
| Feed hole center to body centerdistance | <b>P2</b> | <b>6.35</b> | <b>6.35</b> | <b>6.35</b>    | <b>6.35</b> | <b>6.35</b>    | $\pm 1.0$   |
| Lead to leaddistance                    | <b>F</b>  | <b>2.5</b>  | <b>2.0</b>  | <b>2.5</b>     | <b>3.5</b>  | <b>3.5</b>     | $\pm 0.5$   |
| Height of body from tape center         | <b>H</b>  | <b>18.5</b> | <b>18.5</b> | <b>18.5</b>    | <b>18.5</b> | <b>18.5</b>    | $\pm 0.75$  |
| Base tape width                         | <b>W</b>  | <b>18.0</b> | <b>18.0</b> | <b>18.0</b>    | <b>18.0</b> | <b>18.0</b>    | $\pm 0.5$   |
| Adhesive tape width                     | <b>W0</b> | <b>11.0</b> | <b>11.0</b> | <b>11.0</b>    | <b>11.0</b> | <b>11.0</b>    | <b>min</b>  |
| Hole position                           | <b>W1</b> | <b>9.0</b>  | <b>9.0</b>  | <b>9.0</b>     | <b>9.0</b>  | <b>9.0</b>     | $+0.75-0.5$ |
| Hole down tape position                 | <b>W2</b> | <b>3.0</b>  | <b>3.0</b>  | <b>3.0</b>     | <b>3.0</b>  | <b>3.0</b>     | <b>max</b>  |

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11、其它说明

11. 1 铝电解电容器使用注意事项: IMPORTANT INFORMATION ON THE APPLICATION  
OF ALUMINUM ELECTROLYTIC CAPACITORS

(1) .直流铝电解电容器应按正确的极性使用 DC electrolytic capacitors are polarized

当直流铝电解电容器按反极性接入电路时, 电容器会导致电子线路短路, 由此产生的电流会引致电容器损坏。若电路中有可能在负引线施加正极电压, 请选正极性产品。

When reverse voltage is applied on DC electrolytic capacitor, the capacitor will become short circuited please use non polarized capacitors in the circuit are damage due to abnormal current flows through the capacitors since the circuit where the positive voltage may be applied to the cathode terminal.

(2) .在额定工作电压以下作用 Use capacitor within rated voltage

当电容器上所施加电压高于额定工作电压时, 电容器的漏电流将上升, 其电气特性将在短时期内劣化直至损坏。请注意电压峰值勿超出额定工作电压。

When capacitor is used at higher voltage than the rated voltage, leakage current increases ,characteristics drastically deteriorate and damage in a short period may occur as a result .please take extra caution that the peak voltage should not exceed the rated voltage.

(3) .作快速充放电使用 Charge and discharge application

当常规电容器被用作快速充电用途。其使用寿命可能会因为容量下降, 温度急剧上升等而缩减。

When aluminum electrolytic capacitors for general purpose are employed in rapid charge and discharge application, its life expectancy may be shortened by capacitance decrease, heat rise ,etc.

(4) .电容器贮存 Store the capacitor

当铝电解电容器作了长期贮存后,其漏电流通常升高,贮存温度愈高,漏电流上升愈快,因此应注意贮存环境的选择,在电容器上施加电压后,漏电流值将不断下降,在铝电解电容器的漏电流值上升对电路有不良影响的,请在使用前充电处理。

Increased leakage current is common in aluminum capacitors which have been stored for long period of time .The higher the storage temperature, the higher the leakage current increase therefore please take precautions concerning the storage location. The leakage current causes problems in the circuit ,apply voltage (aging) before using .

(5).施加纹波电流应小于额定值 Ripple current applied to capacitor should not exceed the rated value.

施加纹波电流超过额定值后,会导致电容器体过热,容量下降,寿命缩短.所施加纹波电压的峰值应小于额定工作电压。

Excessive heat will reduce capacitance and result in shortened life of capacitor if ripple currents exceeding the specified rated value are applied .the peak value of the ripple voltage should be less than the rated voltage.

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(6)、引出线强度 Lead stress

当拉力施加到电容器引出线，该拉力将作用于电容器内部，这将导致电容器内部短路、开路或漏电流上升。在电容器焊装到电路板，请勿强烈摇动电容器。

When a strong force is applied to the lead wires or terminals, stress is put on the internal connections. This may result in short circuit, open circuit or increased leakage current. It is not advisable to bend or handle a capacitor after it has been soldered to the PC board.

(7)、焊接过程耐热性 Heat resistance at the soldering process

铝电解电容器装至电路板进行浸焊或波焊时，其塑料套管可能因焊接时间过长、温度过高而发生破裂或二次收缩。

In the dip soldering process of PC board with aluminum electrolytic capacitors mounted, secondary shrinkage or crack of PVC sleeve may be observed when solder temperature is too high or dipping time is too long.

(8)、电路板的安装孔孔距及安装位置 Hole pitch and position of PC board.

电路板的安装孔的设计应与产品说明书的引线脚距相一致，如果将电容器强行插入孔距不配套的电路板，那么会有应力作用于引出线，这将导致短路或漏电流上升。

A PC board must be designed so its hole pitch coincides with the lead pitch (lead spacing) of the capacitor specified by the catalog or specifications. When a capacitor is forcibly inserted into an unmatched hole pitch, a stress is put on the leads. This could result in a short circuit or increased leakage current.

11.2 本产品无铅、无污染 This product is lead free and environmental friendly

本产品（包括所有构件）完全符合欧盟 ROHS 最新标准要求，即 10 种有害物质的最大含量均不超过如下要求：

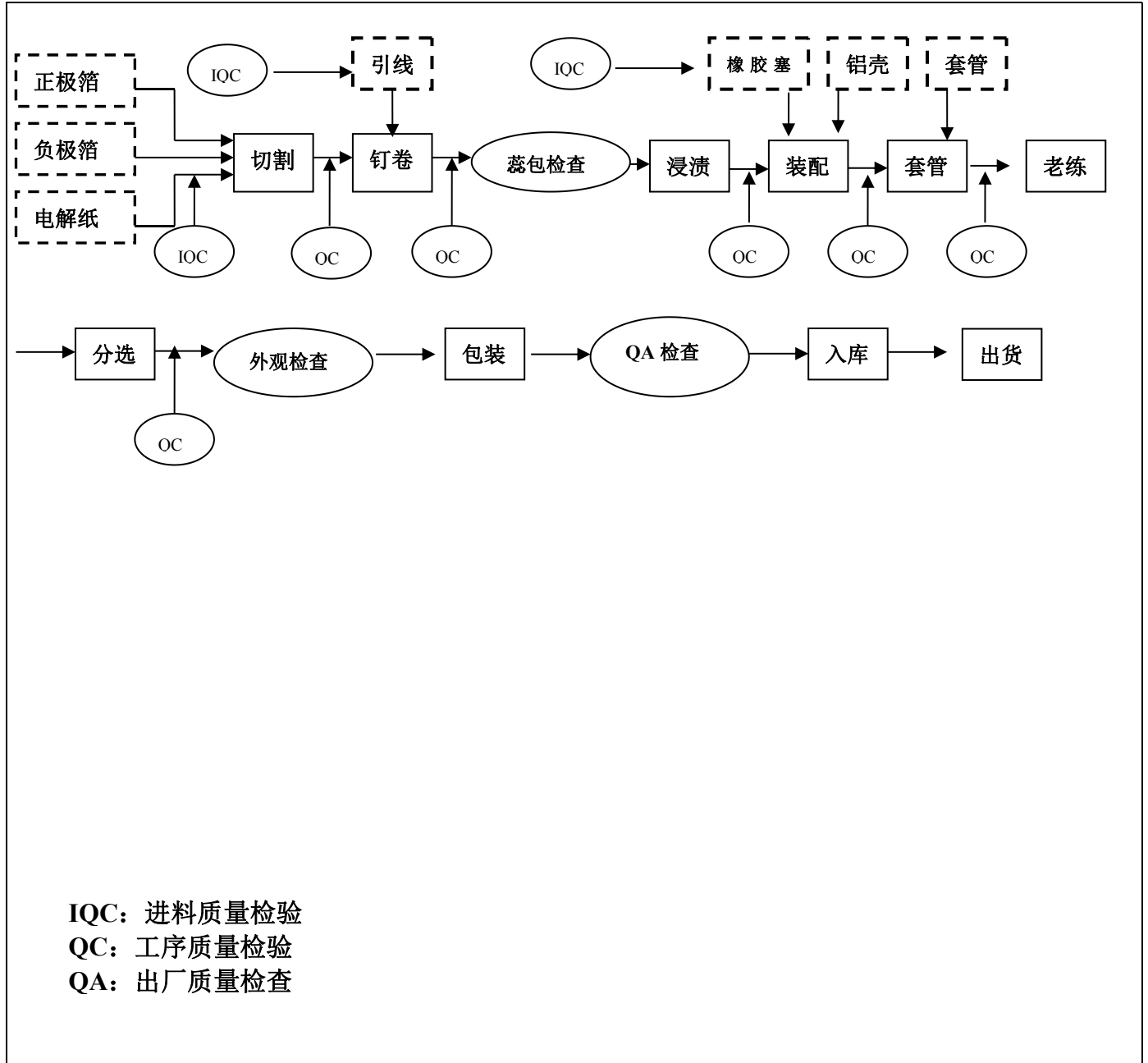
This product is according to the standard of ROHS, it means the max capacitance of ten harmful material not over the following request:

|                                 |                           |                        |
|---------------------------------|---------------------------|------------------------|
| Cd (镉) -100PPM                  | PB (铅) -1000PPM           | Hg (汞) -1000PPM        |
| Cr <sup>6+</sup> (六价铬) -1000PPM | PBBs (多溴联苯) -1000PPM      | PBDEs (多溴联苯醚) -1000PPM |
| DBP (邻苯二甲酸二丁酯) -1000PPM         | BBP (邻苯二甲酸丁苄酯) -1000PPM   |                        |
| DEHP (邻苯二甲酸二(2-乙基己基)酯) -1000PPM | DIBP (邻苯二甲酸二异丁酯) -1000PPM |                        |

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电容器生产流程:



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