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# 承认书 SPECIFICATION

商品名称：固态铝电解电容器

Product: Solid Aluminum Electrolytic Capacitors

型号： PT系列

|   |
|---|
| <p>请客户确认签章<br/><b>APPROVED BY</b></p>                         |
| <p>承认后请寄回一份<br/>Please Return One Copy with Your Approval</p> |

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|-------------------|------------------|-------------------|
|                   |                  |                   |





### 1. 概述 SCOPE

#### 1.1 概述 SCOPE

本承认书规定了铝电解电容器的技术规范。

This specification contains descriptions of the quality of aluminum electrolytic capacitors.

#### 1.2 参考标准 APPLICABLE SPECIFICATION

本承认书参考 JISC-5141 和 JISC-5102 制定。

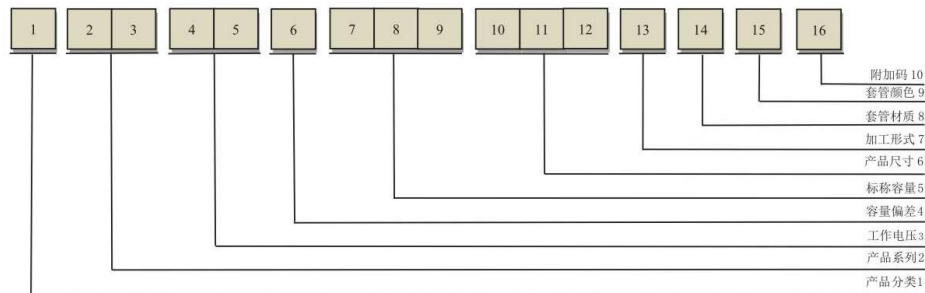
This specification is made based on the Japanese Industrial Standard JISC-5141 Characteristics and JIS C-5102.

#### 1.3 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。

Operating temperature range is the range of ambient temperature at which the capacitor can be operated continuously at rated voltage.

#### 1.4 物料编码 MATERIAL CODING



#### 1.产品分类

| 产品分类       | 代码 |
|------------|----|
| 1          |    |
| 电解电容       | E  |
| 导电性高分子固态电容 | S  |

#### 2.系列

| 系列       | 代码 |
|----------|----|
| CD11-A   | CA |
| CD11-B   | CB |
| CD11-C   | CC |
| CD11-D   | CD |
| CD11-E   | CE |
| CD11-F   | CF |
| CD11-G   | CG |
| CD11-H   | CH |
| CD11-130 | C3 |
| GS       | GS |
| GS-T1    | G1 |
| GS-T2    | G2 |
| GE       | GE |
| GF       | GF |
| CD11-E   | 1E |
| CD11-G   | 1G |
| CD11-H   | 1H |
| CG       | TG |
| CF       | TF |
| LP       | LP |
| LS       | LS |
| HP       | HP |
| HS       | HS |
| LR       | LR |
| PE       | PE |
| PT       | PT |
| VE       | VE |
| VT       | VT |
| GW       | GW |
| DL       | DL |
| NP       | NP |
| CW       | CW |
| SP       | SP |
| SR       | SR |
| GPS      | PS |
| GPF      | PF |
| GPH      | PH |

#### 3.工作电压

| 电压(V) | 代码 |
|-------|----|
| 6.3   | 0J |
| 10    | 1A |
| 16    | 1C |
| 25    | 1E |
| 35    | 1V |
| 50    | 1H |
| 63    | 1J |
| 80    | 1B |
| 100   | 1K |
| 120   | 1I |
| 160   | 2C |
| 200   | 2D |
| 250   | 2E |
| 315   | 2F |
| 350   | 2V |
| 400   | 2G |
| 420   | 2T |
| 450   | 2W |
| 500   | 2H |

#### 4.容量偏差

| 容量偏差     | 代码 |
|----------|----|
| -10~+10% | K  |
| -20~+20% | M  |
| -10~+30% | Q  |
| -10~+50% | T  |
| -10~+20% | V  |
| -0~+20%  | A  |
| -0~+30%  | C  |
| -5~+20%  | B  |
| -10~-20% | D  |
| -5~+5%   | E  |
| -0~+10%  | F  |
| -5~-20%  | N  |
| -15~-+5% | G  |
| -10-0%   | O  |

#### 5.标称容量

| 容量(μF) | 代码  |
|--------|-----|
| 0.1    | 0R1 |
| 0.22   | R22 |
| 0.33   | R33 |
| 0.47   | R47 |
| 0.68   | R68 |
| 1.0    | 010 |
| 2.2    | 2R2 |
| 2.7    | 2R7 |
| 3.3    | 3R3 |
| 4.7    | 4R7 |
| 5.6    | 5R6 |
| 6.8    | 6R8 |
| 10     | 100 |
| 22     | 220 |
| 33     | 330 |
| 47     | 470 |
| 68     | 680 |
| 100    | 101 |
| 180    | 181 |
| 220    | 221 |
| 270    | 271 |
| 330    | 331 |
| 470    | 471 |
| 680    | 681 |
| 820    | 821 |
| 1000   | 102 |
| 1200   | 122 |
| 1500   | 152 |
| 1800   | 182 |
| 2200   | 222 |

#### 6.产品尺寸

| 直径(mm) | 代码 |
|--------|----|
| 4      | C  |
| 5      | D  |
| 6.3    | E  |
| 8      | F  |
| 10     | G  |
| 12     | J  |
| 12.5   | W  |
| 13     | K  |
| 16     | L  |
| 18     | M  |
| 20     | N  |
| 22     | O  |
| 25     | P  |
| 30     | Q  |
| 35     | R  |
| 40     | Y  |
| 51     | S  |

| 长度(mm) | 代码 |
|--------|----|
| 7      | 07 |
| 9      | 09 |
| 11     | 11 |
| 12     | 12 |
| 13     | 13 |
| 14     | 14 |
| 15     | 15 |
| 16     | 16 |
| 17     | 17 |
| 20     | 20 |
| 21     | 21 |
| 25     | 25 |
| 26     | 26 |
| 30     | 30 |
| 35     | 35 |
| 40     | 40 |
| 45     | 45 |
| 50     | 50 |
| 60     | 60 |
| 80     | 80 |

#### 7.加工形式

| 规范要求                         | 代码 |
|------------------------------|----|
| 剪脚 (5φ~22φ)                  | C  |
| 扩脚 (5φ~8φ)                   | F  |
| 成型外 K 脚                      | W  |
| 成型内 K 脚                      | N  |
| Snap in                      | K  |
| Horizontal mounting Terminal | M  |
| 螺柱式                          | S  |
| 贴片                           | T  |
| 三脚                           | S  |
| 四脚                           | Y  |
| 直脚编带                         | B  |
| 扩脚编带                         | P  |
| 散装                           | O  |

#### 8.套管材质

| 套管材质 | 代码 |
|------|----|
| PVC  | C  |
| PET  | T  |

#### 9.套管颜色

| 套管颜色 | 代码 |
|------|----|
| 绿色   | G  |
| 黄色   | Y  |
| 橙色   | O  |
| 红色   | R  |
| 紫色   | P  |
| 黑色   | B  |
| 棕色   | Z  |
| 蓝色   | L  |
| 咖啡色  | C  |
| 墨绿色  | M  |
| 透明   | T  |
| 利华紫  | U  |

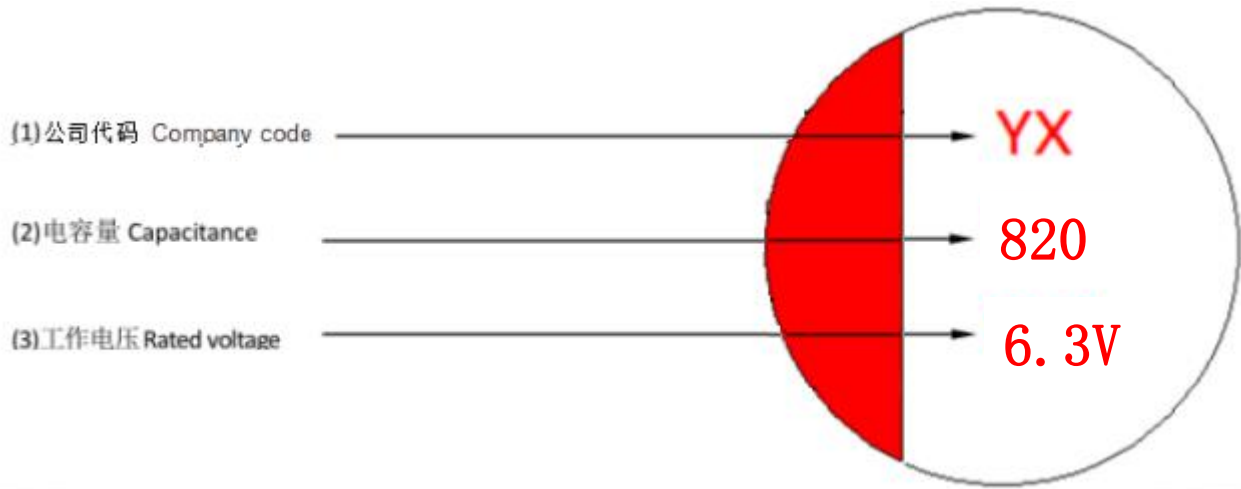
#### 10.附加码

| 附加码 (依客户特殊要求添加) |    |
|-----------------|----|
| 编带包装            | 代码 |
| 折叠装             | Z  |
| 卷绕装             | J  |



2.2 标记 MARKING

2.2.1 在电容器体上应注明如下内容 The following items shall be marked indelibly on the surface of capacitor:



3. 主要特性表 MAIN SPECIFICATIONS

| 项目 Item   | 主要特性 Performance Characteristics   |  |
|---|--|--|
| 使用温度范围<br>Operating Temperature Range                           | -55°C~+105°C   |  |
| 额定工作电压范围<br>Rated Voltage Range                                 | 2.5~63V.DC   |  |
| 静电容量允许偏差<br>Capacitance Tolerance                               | ±20% (M, +20°C, 120Hz)   |  |
| 浪涌电压<br>Surge Voltage   | Rated Voltage x 1.15V  |  |
| 漏电流<br>Leakage current  | 见第 5 项尺寸表  |  |
| 损失<br>Dissipation Factor  | 见第 5 项尺寸表  |  |
| 高低温的阻抗比<br>Characteristics of Impedance at Low,high Temperature | $Z(-55^{\circ}\text{C})/Z(+20^{\circ}\text{C}) \leq 1.25$ (at-55°C, 100KHz)<br>$Z(105^{\circ}\text{C})/Z(+20^{\circ}\text{C}) \leq 1.25$ (at105°C, 100KHz)                               |  |
| 高温负荷特性<br>Endurance   | 在 105°C 环境中施加额定工作电压 2000 小时后,电容器的性能符合下面要求:<br>The specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2000 hours at 105°C. |  |
|   | 外观<br>Appearance   | 没有明显变化<br>No significant damage                        |
|   | 容量变化<br>Capacitance Charge   | 小于初始值的±20%<br>≤±20% of the initial specified value     |
|   | 损失<br>DF   | 小于初始值的 150%<br>≤ ± 150% of the initial specified value |
|   | 阻抗<br>ESR  | 小于初始值的 150%<br>≤ ± 150% of the initial specified value |
|   | 漏电流<br>Leakage current   | 小于初始值<br>≤the initial specified value                  |



| 项目 Item                          | 主要特性 Performance Characteristics  |  |                                 |                            |  |          |  |           |  |                        |                                       |
|----------------------------------|---|--|---------------------------------|----------------------------|--|----------|--|-----------|--|------------------------|---------------------------------------|
| 湿热稳定性<br>Damp Heat, Steady State | 在 60℃,湿度为 90~95%, 无直流电的环境中放置 1000 小时后,电容器的性能符合以下的要求:<br>The specifications shall be satisfied when the capacitors are restored to 20 °C sfter subjected to store at 60 °C ,90 to 95% RH for 1000 hours,without DC applied.  |  |                                 |                            |  |          |  |           |  |                        |                                       |
|                                  | <table border="1"> <tr> <td>外观<br/>Appearance</td> <td>没有明显变化<br/>No significant damage</td> </tr> <tr> <td>容量变化<br/>Capacitance Charge</td> <td>小于初始值的±20%<br/>≤±20% of the initial specified value</td> </tr> <tr> <td>损失<br/>DF</td> <td>小于初始值的 150%<br/>≤ ± 150% of the initial specified value</td> </tr> <tr> <td>阻抗<br/>ESR</td> <td>小于初始值的 150%<br/>≤ ± 150% of the initial specified value</td> </tr> <tr> <td>漏电流<br/>Leakage current</td> <td>小于初始值<br/>≤the initial specified value</td> </tr> </table> | 外观<br>Appearance                                       | 没有明显变化<br>No significant damage | 容量变化<br>Capacitance Charge | 小于初始值的±20%<br>≤±20% of the initial specified value | 损失<br>DF | 小于初始值的 150%<br>≤ ± 150% of the initial specified value | 阻抗<br>ESR | 小于初始值的 150%<br>≤ ± 150% of the initial specified value | 漏电流<br>Leakage current | 小于初始值<br>≤the initial specified value |
|                                  | 外观<br>Appearance  | 没有明显变化<br>No significant damage                        |                                 |                            |  |          |  |           |  |                        |                                       |
|                                  | 容量变化<br>Capacitance Charge  | 小于初始值的±20%<br>≤±20% of the initial specified value     |                                 |                            |  |          |  |           |  |                        |                                       |
|                                  | 损失<br>DF  | 小于初始值的 150%<br>≤ ± 150% of the initial specified value |                                 |                            |  |          |  |           |  |                        |                                       |
|                                  | 阻抗<br>ESR   | 小于初始值的 150%<br>≤ ± 150% of the initial specified value |                                 |                            |  |          |  |           |  |                        |                                       |
| 漏电流<br>Leakage current           | 小于初始值<br>≤the initial specified value   |  |                                 |                            |  |          |  |           |  |                        |                                       |
|                                  |   |  |                                 |                            |  |          |  |           |  |                        |                                       |
|                                  |   |  |                                 |                            |  |          |  |           |  |                        |                                       |
|                                  |   |  |                                 |                            |  |          |  |           |  |                        |                                       |
| 浪涌电压<br>Surge Voltage            | 在 105℃, 电阻为 1KΩ 的环境下充电 30 秒和在不充电情况下放置 5 分钟 30 秒, 循环操作 1000 次, 电容器的性能符合以下的要求:<br>The capacitors shall be subjected to 1000 cycle each consisting of charge with the surge voltages specified at 105 °C for 30 seconds through a protective resistor (R=1KΩ) and discharge for 5 minutes 30 seconds.  |  |                                 |                            |  |          |  |           |  |                        |                                       |
|                                  | <table border="1"> <tr> <td>外观<br/>Appearance</td> <td>没有明显变化<br/>No significant damage</td> </tr> <tr> <td>容量变化<br/>Capacitance Charge</td> <td>小于初始值的±20%<br/>≤±20% of the initial specified value</td> </tr> <tr> <td>损失<br/>DF</td> <td>小于初始值的 150%<br/>≤ ± 150% of the initial specified value</td> </tr> <tr> <td>阻抗<br/>ESR</td> <td>小于初始值的 150%<br/>≤ ± 150% of the initial specified value</td> </tr> <tr> <td>漏电流<br/>Leakage current</td> <td>小于初始值<br/>≤the initial specified value</td> </tr> </table> | 外观<br>Appearance                                       | 没有明显变化<br>No significant damage | 容量变化<br>Capacitance Charge | 小于初始值的±20%<br>≤±20% of the initial specified value | 损失<br>DF | 小于初始值的 150%<br>≤ ± 150% of the initial specified value | 阻抗<br>ESR | 小于初始值的 150%<br>≤ ± 150% of the initial specified value | 漏电流<br>Leakage current | 小于初始值<br>≤the initial specified value |
|                                  | 外观<br>Appearance  | 没有明显变化<br>No significant damage                        |                                 |                            |  |          |  |           |  |                        |                                       |
|                                  | 容量变化<br>Capacitance Charge  | 小于初始值的±20%<br>≤±20% of the initial specified value     |                                 |                            |  |          |  |           |  |                        |                                       |
|                                  | 损失<br>DF  | 小于初始值的 150%<br>≤ ± 150% of the initial specified value |                                 |                            |  |          |  |           |  |                        |                                       |
|                                  | 阻抗<br>ESR   | 小于初始值的 150%<br>≤ ± 150% of the initial specified value |                                 |                            |  |          |  |           |  |                        |                                       |
| 漏电流<br>Leakage current           | 小于初始值<br>≤the initial specified value   |  |                                 |                            |  |          |  |           |  |                        |                                       |
|                                  |   |  |                                 |                            |  |          |  |           |  |                        |                                       |
|                                  |   |  |                                 |                            |  |          |  |           |  |                        |                                       |
|                                  |   |  |                                 |                            |  |          |  |           |  |                        |                                       |
|                                  |   |  |                                 |                            |  |          |  |           |  |                        |                                       |

4. 产品结构 PRODUCT STRUCTURE (mm)

4.1 外形尺寸 SHAPE AND DIMENSIONS





| ØD  | 5          | 6.3 | 8   | 10  |
|-----|------------|-----|-----|-----|
| Ød  | 0.5        | 0.6 | 0.6 | 0.6 |
| F   | 2.0        | 2.6 | 3.5 | 5.3 |
| ØD` | ØD+0.5max. |     |     |     |
| L`  | L+2max     |     |     |     |

5. 尺寸表、允许纹波电流 DIMENSIONS AND RIPPLE CURRENT

◆贴片电解标称容量纹波电流对照表

| 额定电压 (V) | 浪涌电压 (V) | 标称容量 (uF) | 尺寸ΦD×L (mm) | Tan δ (120Hz, 20°C) | ESR (mΩ/at 100KHz, 20°C) | 额定纹波电流 (mA/rms at 100KHz, 105°C) |
|----------|----------|-----------|-------------|---------------------|--------------------------|----------------------------------|
| 4        | 4.6      | 150       | 6.3*5.9     | 0.12                | 22                       | 2570                             |
|          |          | 270       | 8*6.7       | 0.12                | 22                       | 3220                             |
|          |          | 330       | 6.3*5.9     | 0.12                | 20                       | 2800                             |
|          |          |           | 8*6.7       | 0.12                | 22                       | 3220                             |
|          |          | 560       | 8*6.7       | 0.12                | 18                       | 3600                             |
|          |          | 680       | 10*7.7      | 0.12                | 20                       | 4130                             |
| 6.3      | 7.2      | 100       | 6.3*5.9     | 0.12                | 22                       | 2800                             |
|          |          | 120       | 6.3*5.9     | 0.12                | 22                       | 2800                             |
|          |          | 220       | 6.3*5.9     | 0.12                | 20                       | 2800                             |
|          |          |           | 8*6.7       | 0.12                | 22                       | 3220                             |
|          |          | 390       | 8*6.7       | 0.12                | 22                       | 3220                             |
|          |          | 470       | 10*7.7      | 0.12                | 20                       | 4130                             |
| 10       | 12       | 56        | 6.3*5.9     | 0.12                | 27                       | 2300                             |
|          |          | 68        | 6.3*5.9     | 0.12                | 27                       | 2300                             |
|          |          | 120       | 6.3*5.9     | 0.12                | 27                       | 2300                             |
|          |          | 150       | 8*6.7       | 0.12                | 30                       | 2760                             |
|          |          |           | 10*7.7      | 0.12                | 30                       | 3020                             |
|          |          | 270       | 8*6.7       | 0.12                | 22                       | 3200                             |
|          |          | 330       | 10*7.7      | 0.12                | 24                       | 3770                             |
| 16       | 18       | 39        | 6.3*5.9     | 0.12                | 30                       | 2200                             |
|          |          | 68        | 6.3*5.9     | 0.12                | 30                       | 2200                             |
|          |          | 82        | 8*6.7       | 0.12                | 28                       | 2800                             |
|          |          | 100       | 10*7.7      | 0.12                | 35                       | 2670                             |
|          |          | 120       | 8*6.7       | 0.12                | 28                       | 2800                             |
|          |          | 180       | 10*7.7      | 0.12                | 29                       | 3430                             |
|          |          | 820       | 10*12.6     | 0.12                | 12                       | 5400                             |
| 20       | 23       | 56        | 6.3*5.9     | 0.12                | 48                       | 1300                             |
|          |          | 270       | 8*12        | 0.12                | 21                       | 4000                             |
|          |          | 390       | 8*12        | 0.12                | 14                       | 4950                             |
|          |          | 470       | 10*12.6     | 0.12                | 20                       | 4300                             |
| 25       | 29       | 47        | 6.3*5.9     | 0.12                | 49                       | 1300                             |
|          |          | 150       | 8*12        | 0.12                | 28                       | 2200                             |
|          |          | 270       | 10*12.6     | 0.12                | 27                       | 2700                             |
| 35       | 40       | 18        | 6.3*5.9     | 0.12                | 64                       | 900                              |
|          |          | 82        | 8*12        | 0.12                | 29                       | 2200                             |
|          |          | 150       | 10*12.6     | 0.12                | 28                       | 2600                             |

6. 贮存方法 STORAGE METHODS

保存期限：1 年，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：5 至 35℃；相对湿度：45 至 85%；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：20±2℃；相对湿度：60 至 70%；大气压力：86kpa 至 106kpa。

Storage life : 1year , Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests are as follows.

Ambient temperature: 5 to 35°C Relative humidity: 45 to 85% Air pressure: 86kpa to 106kpa.

If there may be doubt on the results, measurements shall be made within the following limits.

Ambient temperature: 20±2°C Relative humidity: 60 to 70% Air pressure: 86kpa to 106kpa.



### 7. 其它说明 OTHERS

#### 7.1 铝电解电容器使用注意事项 Important information on the application of aluminium 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被反极性接入电路时，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，请选用无极性产品。

When reverse voltage is applied on DC electrolytic capacitor, the capacitor will become short-circuited please use non-polarized capacitors in the circuit or the capacitor will be 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 may be shorted by capacitance decreasing, heat rising, 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。

I creased 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 decreases gradually as voltage is applied to the capacitor. In cases where increased 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.

##### (6).使用环境温度 Ambient temperature.

铝电解电容器的使用寿命会受到环境温度的影响。据科学统计，使用环境温度下降 10℃ 其使用寿命增加 1 倍。

Its ambient temperature closely affects the life of an aluminum electrolytic capacitor. It is generally stated, that life doubles for each 10℃ decrease in temperature.

##### (7).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 PCB board.

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

电路板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。

PCB board must be designed so its hole 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, a stress is put on the leads. This could result in a short circuit or increased leakage current.

#### 7.2 本产品不含铅、镉等元素 This product does not include Plumbum or Cadmium.

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