

# 规格承认书

Specification for Approval

|                        |                                                   |
|------------------------|---------------------------------------------------|
| 产品名称<br>Product Name   | 金属化聚酯膜电容器<br>Metallized polyester film capacitors |
| 型号规格<br>Type & Spec.   | CL21X-520V-333K-P5                                |
| 万盛料号<br>Walson's P/N   | C212T33346P20001                                  |
| 文件编号<br>Document No.   | WSCRS-2025110442                                  |
| 客 户<br>Customer        | 立创商城                                              |
| 客户料号<br>Customer's P/N | C52205136                                         |

| 供方确认 Supplier confirmation                                                          | 客户承认 Customer Approval |
|-------------------------------------------------------------------------------------|------------------------|
|  |                        |

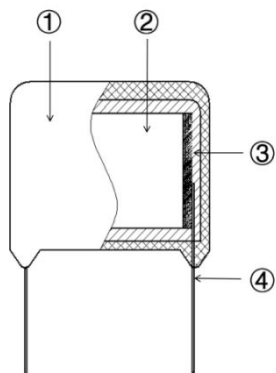
请于承认后签章回执一份  
Please sign for approval and reply



无锡万盛电子有限公司  
WUXI WALSON ELECTRONICS CO., LTD.

地址: 江苏无锡江阴市长泾镇兴业路 22 号 电话 Tel.: +86-510-88719928  
Addr.: No.22, Xingye RD, Changjing Town, Jiangyin City, Jiangsu, China  
E-Mail: walson@walson-elec.com Website: www.walson-elec.com

1. 结构 Construction



本产品由金属化聚酯薄膜卷绕而成，端面喷涂无铅金属并焊接引线，外部采用阻燃环氧树脂包封。  
The product is winding by metallized polyester film. Both end faces of the core sprayed with lead-free metal and welded with leads, and the exterior is wrapped with flame-retardant epoxy resin.

- ① 环氧包封料      Encapsulating Material
- ② 芯子              Core
- ③ 喷金层            Sprayed Metal Layer
- ④ 引出线            Lead Wire

2. 外形尺寸 Dimensions

|  |  | 引线成型图示 Forming Lead Shapes |        |        |        |
|--|--|----------------------------|--------|--------|--------|
|  |  |                            |        |        |        |
|  |  | Fig. 1                     | Fig. 2 | Fig. 3 | Fig. 4 |

| 客户料号<br>Customer's P/N | 规格型号 & 料号<br>Spec. & Walson's P/N      | 容量<br>偏差<br>Tol.±% | 外形尺寸 Outline Dimensions (mm) |          |          |           |           |           |          | 图示<br>Fig. |
|------------------------|----------------------------------------|--------------------|------------------------------|----------|----------|-----------|-----------|-----------|----------|------------|
|                        |                                        |                    | W<br>Max                     | H<br>Max | T<br>Max | P<br>±0.5 | F<br>±0.5 | d<br>±0.1 | L<br>Min |            |
| C52205136              | CL21X-520V-333K-P5<br>C212T33346P20001 | 10                 | 7.5                          | 7.5      | 4.5      | 5         | -         | 0.5       | 20       | 1          |

### 3. 特点及主要用途 Feature and Application

#### ☆ 主要用途

- 适用于直流和 VHF 级信号的隔直流、旁路和耦合
- 广泛用于滤波、低脉冲电路

#### ☆ Application

- Suitable for blocking, by-pass and coupling of DC and signals to VHF range
- Widely used in filter and low pulse circuits

#### ☆ 特点

- 金属化聚酯膜,无感卷绕结构
- 容量范围宽,体积小,重量轻
- 自愈性好,寿命长
- 阻燃环氧粉末包封 (UL94/V-0)

#### ☆ Characteristics

- Metallized polyester film, non-inductive wound construction
- Wide capacitance range, small size, and light weigh
- Long life due to self-healing effect
- Flame retardant epoxy resin powder coating (UL94/V-0)

#### ☆ 技术要求 Specifications

|                                       |                                                                                  |                       |
|---------------------------------------|----------------------------------------------------------------------------------|-----------------------|
| 引用标准<br>Reference Standard            | GB/T 7332-2011 (idt IEC 60384-2) RoHS                                            |                       |
| 工作温度范围<br>Operating Temperature Range | -40 °C ~ +105 °C                                                                 |                       |
| 额定温度<br>Rated Temperature             | 85 °C<br>(+85 °C to +105 °C decreasing factor 1.25 % per °C for $U_R$ )          |                       |
| 额定电压<br>Rated Voltage                 | 100/160/250/400/450V/630/1000/1250 VDC                                           |                       |
| 电容量范围<br>Capacitance Range            | 0.0010 $\mu$ F ~ 10.0 $\mu$ F                                                    |                       |
| 电容量偏差<br>Capacitance Tolerance        | $\pm 5\%$ (J)、 $\pm 10\%$ (K)                                                    | (20 °C, 1 kHz, 1 V)   |
| 耐电压<br>Voltage Proof                  | 1.6 $U_R$                                                                        | (20 °C, 5 s)          |
| 损耗角正切值<br>Dissipation Factor          | $\leq 0.0090$ $C_R < 1.0 \mu$ F<br>$\leq 0.0100$ $C_R \geq 1.0 \mu$ F            | (20 °C, 1 kHz, 1 V)   |
| 绝缘电阻<br>Insulation Resistance         | $\geq 7500 M\Omega$<br>$\geq 2500 s$ $C_R \leq 0.33 \mu$ F<br>$C_R > 0.33 \mu$ F | (20 °C, 100 V, 1 min) |

## 4. 可靠性测试 Reliability Test

| 序号<br>No. | 测试项目<br>Test Item                 | 测试方法<br>Test method                                                                                                                                                                                                                                                                                         | 要求<br>Requirement                                                                                                                                        |
|-----------|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1         | 外部检查<br>Outline check             | 目视检查, 卡尺测量<br>Visual inspection and capliper measurement                                                                                                                                                                                                                                                    | 外形规整, 无可见损伤; 标志端正、清晰、无误<br>The appearance is regular without visible damage; The mark is regular, clear and correct.                                     |
|           | 初始测量<br>Initial measurement       | 电容量 C: 20 °C, 1 kHz, 1V<br>损耗角正切 Tan δ: 20 °C, 1 kHz, 1 V                                                                                                                                                                                                                                                   |                                                                                                                                                          |
|           | 引出端<br>强度<br>Terminal<br>Strength | 拉力: 5 N<br>方向: 180 °<br>时间: 10±1 s<br><br>Pull: 5 N<br>Direction: 180 °<br>Time: 10±1 s                                                                                                                                                                                                                     | 无可见损伤<br><br>No visible damage                                                                                                                           |
|           |                                   | 弯曲<br>The pull of bend<br>拉力: 2.5 N<br>方向: 90 °<br>次数: 2 次<br><br>The pull of bend: 2.5 N<br>Direction: 90 °<br>Times: 2                                                                                                                                                                                    | 无可见损伤<br><br>No visible damage                                                                                                                           |
|           | 耐焊接热<br>Soldering Heat Resistance | 焊槽温度: +260 °C±5 °C<br>浸入时间: 10 s±1 s<br>浸入深度离安装面 2+0/-0.5 mm, 采用厚度为 1.5 mm±0.5 mm 的绝热屏蔽板<br><br>Solder temperature: 260 °C±5 °C<br>Immersion time: 10 s±1 s<br>Immersion depth is 2+0/-0.5 mm away from the installation surface, and insulation shielding plate with a thickness of 1.5mm ± 0.5 mm is used | 无可见损伤<br><br>No visible damage                                                                                                                           |
|           | 最后测量<br>Final measurement         |                                                                                                                                                                                                                                                                                                             | 容量变化: $ \Delta C/C  \leq 2\%$<br>损耗变化: $\Delta \tan \delta \leq 0.005$ (1 kHz)<br><br>$ \Delta C/C  \leq 2\%$<br>$\Delta \tan \delta \leq 0.005$ (1 kHz) |
| 2         | 初始测量<br>Initial measurement       | 电容量 C: 20 °C, 1 kHz, 1V<br>损耗角正切 Tan δ: 20 °C, 1 kHz, 1V                                                                                                                                                                                                                                                    |                                                                                                                                                          |
|           | 可焊性<br>Solderability              | 焊槽温度: 235 °C±5 °C<br>浸入时间: 2.0 s±0.5 s<br><br>Solder temperature: 235 °C ±5 °C<br>Immersion time: 2.0 s±0.5 s                                                                                                                                                                                               | 引线表面浸锡良好, 焊层面积达 95 % 以上<br><br>The surface of the lead wire is well tinned, and the welding layer area reaches over 95 %                                 |

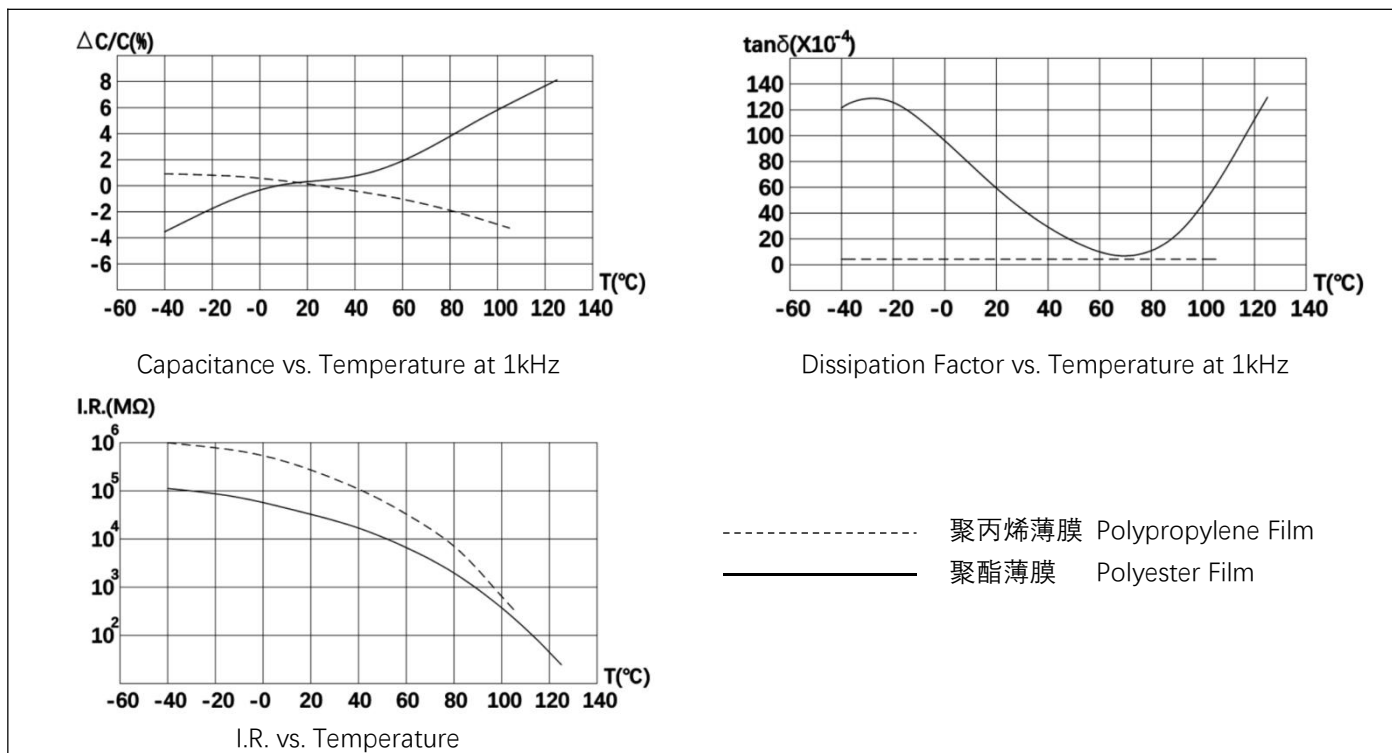
| 序号<br>No. | 测试项目<br>Test Item                     |                              | 测试方法<br>Test method                                                                                                                                                                                                                                                   | 要求<br>Requirement                                                                                                                                                                                                                                                                                                                           |
|-----------|---------------------------------------|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2         | 温度快速变化<br>Rapid Change of Temperature |                              | $\theta A = -40\text{ }^{\circ}\text{C}$<br>$\theta B = +125\text{ }^{\circ}\text{C}$<br>循环次数: 5 次,<br>持续时间 $t=30\text{ min}$<br><br>$\theta A = -40\text{ }^{\circ}\text{C}$<br>$\theta B = +125\text{ }^{\circ}\text{C}$<br>5 cycles<br>Duration: $t=30\text{ min}$ | 无可见损伤<br><br>No visible damage                                                                                                                                                                                                                                                                                                              |
|           | 振动<br>Vibration                       |                              | 频率范围: 10--500 Hz<br>振幅 : 0.75 mm<br>试验安装方向: X, Y, Z.<br>试验每个方向持续时间 : 2 h<br><br>Frequency range: 10 Hz to 500 Hz<br>Amplitude: 0.75 mm<br>Test installation direction: X,Y,Z,<br>Test duration in each direction: 2 h                                                 | 无可见损伤<br><br>No visible damage                                                                                                                                                                                                                                                                                                              |
|           | 碰撞<br>Bump                            |                              | 碰撞次数: 4000 次<br>加速度: 390 m/s <sup>2</sup><br>脉冲持续时间: 6 ms<br><br>Times of collisions: 4000 times<br>Acceleration: 390 m/s <sup>2</sup><br>Pulse duration: 6 ms                                                                                                        | 无可见损伤<br><br>No visible damage                                                                                                                                                                                                                                                                                                              |
|           | 最后测量<br>Final measurement             |                              |                                                                                                                                                                                                                                                                       | 无可见损伤<br>容量变化: $ \Delta C/C  \leq 5\%$<br>损耗变化: $\tan \delta \leq 0.005$ (1 kHz)<br>绝缘电阻: $\geq$ 初始测量值的 50 %<br><br>No visible damage<br>$ \Delta C/C  \leq 5\%$<br>$\Delta \tan \delta \leq 0.005$ (1 kHz)<br>I.R. $\geq 50\%$ of the rated value                                                                                          |
| 3         | 气候顺序<br>Climate Sequence              | 干热<br>Dry Heat               | +125 $^{\circ}\text{C}$ , 16 h                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                             |
|           |                                       | 循环湿热<br>Damp Heat<br>Cyclic  | 湿热试验 Db, 严酷度 b 第一次循环<br><br>Test Db, Severity: b, the first cycle                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                             |
|           |                                       | 寒冷<br>Cold                   | -40 $^{\circ}\text{C}$ , 2 h                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                             |
|           |                                       | 循环湿热<br>Damp Heat<br>Cyclic  | 试验 Db, 严酷度 b 其余循环<br><br>Test Db, Severity b, the other cycles,                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                             |
|           |                                       | 最后测量<br>Final<br>Measurement |                                                                                                                                                                                                                                                                       | 外观无可见损伤, 标志清晰<br>电容量变化: $ \Delta C/C  \leq 5\%$ ,<br>损耗角正切的增加: $\Delta \tan \delta \leq 0.008$ (1 kHz)<br>绝缘电阻: $\geq$ 额定值的 50 %<br><br>There shall be no evidence of deterioration and the marking shall be legible.<br>$ \Delta C/C  \leq \pm 5\%$<br>Increase of $\tan \delta \leq 0.008$ (1 kHz)<br>I.R. $\geq 50\%$ of the rated value |

| 序号<br>No. | 测试项目<br>Test Item                      | 测试方法<br>Test method                                                                                                                                                  | 要求<br>Requirement                                                                                                                                                                                                                                                                         |
|-----------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4         | 初始测量<br>Initial measurement            | 电容量 C: 20 °C, 1 kHz, 1V<br>损耗角正切 Tan δ: 20 °C, 1 kHz, 1V                                                                                                             |                                                                                                                                                                                                                                                                                           |
|           | 稳态湿热<br>Damp Heat Steady State         | 温度: +40 °C±2 °C<br>相对湿度: 93 %±2 %RH<br>试验周期: 21 天<br><br>Temperature: +40°C±2 °C<br>Humidity: 93 %±2 %RH<br>Duration: 21 Days                                        | 无可见损伤<br><br>No visible damage                                                                                                                                                                                                                                                            |
|           | 最后测量<br>Final measurement              |                                                                                                                                                                      | 容量变化   ΔC/C   ≤ 5 %<br>损耗变化 ΔTan δ ≤ 0.005 (1 kHz)<br>绝缘电阻 I.R. ≥ 初始测量值的 50 %<br><br>  ΔC/C   ≤ 5 %<br>ΔTan δ ≤ 0.005 (1 kHz)<br>I.R. ≥ 50 % of the rated value                                                                                                                           |
| 5         | 初始测量<br>Initial measurement            | 电容量 C: 20 °C, 1 kHz, 1V<br>损耗角正切 Tan δ: 20 °C, 1 kHz, 1V                                                                                                             |                                                                                                                                                                                                                                                                                           |
|           | 耐久性<br>Endurance                       | 温度: +85 °C±2 °C<br>试验周期: 1000 小时<br>施加电压: 1.25 U <sub>R</sub><br><br>Temperature: +85 °C±2 °C<br>Duration: 1000 (h)<br>Test voltage: 1.25 U <sub>R</sub>             | 无可见损伤, 标志清晰<br><br>No visible damage                                                                                                                                                                                                                                                      |
|           | 最后测量<br>Final measurement              |                                                                                                                                                                      | 容量变化:   ΔC/C   ≤ 8 %<br>损耗变化: ΔTan δ ≤ 0.005 (1 kHz)<br>绝缘电阻: ≥ 初始测量值的 50 %<br><br>  ΔC/C   ≤ 8 %<br>Δtan δ ≤ 0.005 (1 kHz)<br>I.R. ≥ 50 % of the rated value                                                                                                                             |
| 6         | 随温度而定的特性<br>Temperature Characteristic | 静态法, 电容器依次保持在下述每个温度:<br>Static method, the capacitor is maintained at each of the following temperatures in sequence:<br><br>b.(20±2) °C, d.(-40±2) °C, f.(105±2) °C | 在 b,d,f 点上进行电容量测量<br>在下限类温度(-40 °C)时的特性:<br>Measurement of capacitance at points b, d, and f, characteristics at lower limit temperature (-40 °C):<br>-3.6 % ≤ ΔC/C ≤ 0<br><br>在上限类别温度(105 °C)时的特性:<br>Characteristics at upper limit category temperature (105 °C):<br>0 ≤ ΔC/C ≤ +6.3 % |

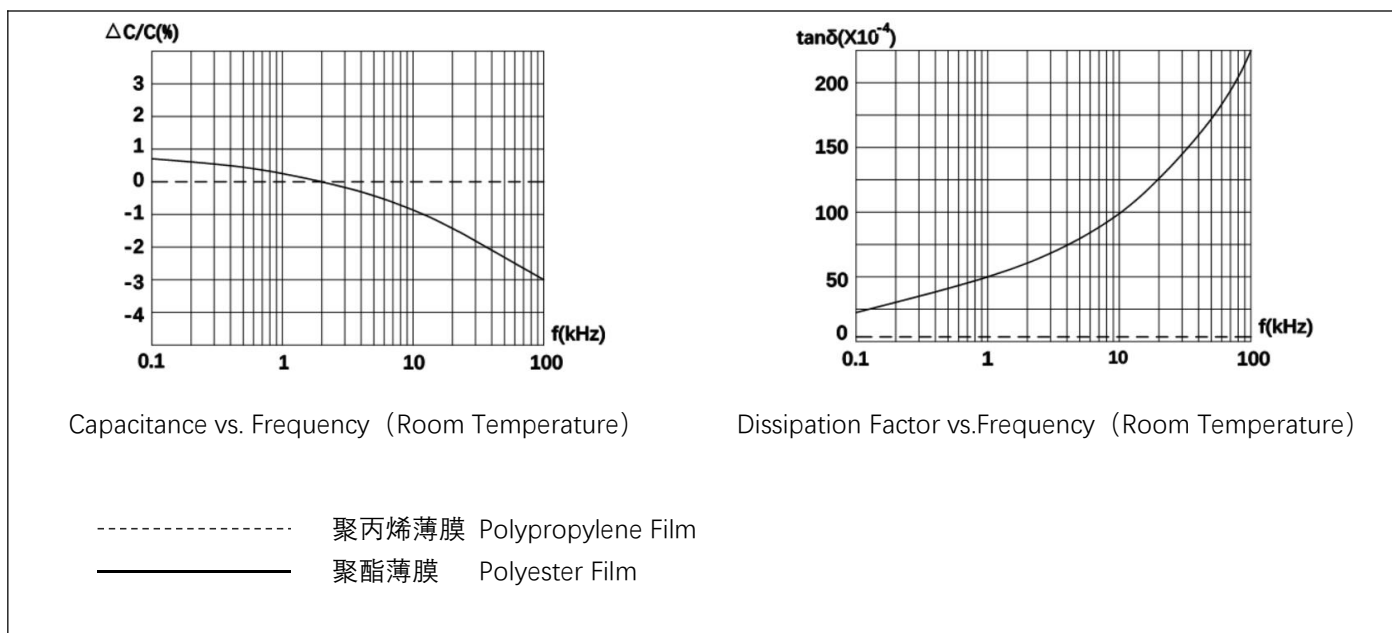
| 序号<br>No. | 测试项目<br>Test Item                 | 测试方法<br>Test method                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 要求<br>Requirement                                                                                                                                                                                                          |
|-----------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 7         | 初始测量<br>Initial measurement       | 电容量 C: 20 °C, 1 kHz, 1V<br>损耗角正切 Tan $\delta$ : 20 °C, 1 kHz, 1 V                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                            |
|           | 充电和放电<br>Charging and Discharging | 充电次数: 10000 次<br>充电电压: $1.0 U_R$<br>充电时间: 0.5 s<br>放电时间: 0.5 s<br>充电电阻: $220/C_R \Omega$<br>放电电阻: $R=10/C_R$ 或 $20 \Omega$ 取较大者 $C_R$ :<br>额定电容量 ( $\mu F$ )<br><br>Times: 10000<br>Charging voltage: $1.0 U_R$<br>Duration of charging: 0.5 s<br>Duration of discharging: 0.5 s<br>Charging resistance: $220/C_R (\Omega)$ or<br>current intensity $\leq 1A$ (whichever is the less<br>current intensity)<br>Discharging resistance: $R=U_R/(C_R \times dv/dt)$<br>$C_R$ : rated capacitance ( $\mu F$ ) |                                                                                                                                                                                                                            |
|           | 最后测量<br>Final measurement         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 容量变化: $ \Delta C/C  \leq 5\%$<br>损耗变化: $\Delta \tan \delta \leq 0.005$ (1 kHz)<br>绝缘电阻: $\geq$ 初始测量值的 50%<br><br>$ \Delta C/C  \leq 5\%$<br>$\Delta \tan \delta \leq 0.005$ (1 kHz)<br>I.R. $\geq 50\%$ of the rated value |

## 5. 产品特性曲线图 Graphs of Product Characteristics

### ☆ 温度特性曲线 Temperature Characteristic Curve



### ☆ 频率特性曲线 Frequency Characteristic Curve





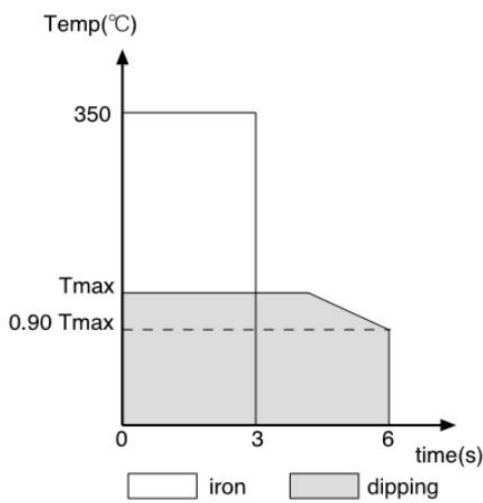
6. 焊接 Weld

焊接电容器时，热量会对电容器的引线 and 包封层产生影响，并且高温，以及长时间焊接都会对电容器的性能造成影响，甚至导致失效。

When welding, heat can have an impact on the leads and packaging layer of the capacitor, and high temperature and prolonged welding can affect the performance of the capacitor, even leading to failure.

焊接条件按下面的焊接图表：

The welding conditions are shown in the following welding chart



|             | Tmax | Time | Note      |
|-------------|------|------|-----------|
| Pre-heating | 110℃ | 1min |           |
|             | 100℃ | 1min | OPP ≤ 7.5 |
| Soldering   | 270℃ | 4s   |           |
|             | 260℃ | 4s   | OPP ≤ 7.5 |