

厚膜晶片排阻承认书-CA 系列

Approval Specification for Thick Film Chip Array Resistors - Type **CA**

1. 范围 (scope) :

1.1 适用于本公司所生产的无铅、无卤之厚膜晶片排阻 CA 系列

This specification applies to thick film chip array resistors which meet requirements of Pb free and halogen free.

1.2 本公司的无铅产品指的晶片电阻端电极无铅，而存在于电阻层的玻璃中的符合 RoHS 豁免条款。

There no lead exists in terminal of resistor, and lead which exist in glass of resistor layer meets RoHS exemption.

2. 产品料号 (part number) :

8P4R (0603) 1/10W 5% 1K Ω

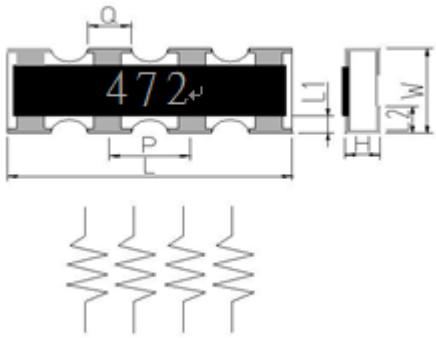
CA034AJA0102G

| <u>CA</u> | <u>034A</u> | <u>J</u> | <u>A</u> | <u>0102</u> | <u>G</u> |
|---|--|--|---|--|--|
| ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| 类型(Type) CA: 厚膜晶片 排阻(thick film chip array resistors) | 尺寸(Size) 024A=8P4R(0402) 034A=8P4R(0603) | 公差 Tolerance F=±1% G=±2% J=±5% | 额定功率 Rated Power A= 1/10W F= 1/16W | 阻值 Resistance value ±1% : 49R9=49.9 Ω 1002=10K Ω ±2% , ±5% : 06R8=6.8 Ω 0564=560K Ω | 包装代码 Packing Code G= reel (卷装) V= bulk (散料) S= Double Standard Quantity (两倍卷 盘标准包装量) |

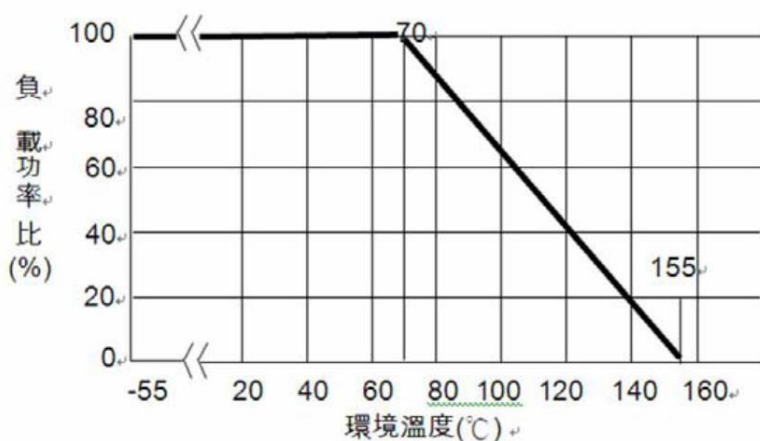
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3. 尺寸 (dimension) :

| 尺寸 dimension | CA024A / CA034A  | | | | | | |
|-----------------|--|-----------|-----------|-----------|-----------|-----------|-----------|
| | 单位 (unit) : mm | | | | | | |
| 型别 (Type) | L | W | T | L1 | Q | P | L2 |
| CA024A | 2.00±0.10 | 1.00±0.10 | 0.40±0.05 | 0.18±0.10 | 0.33±0.10 | 0.50±0.10 | 0.26±0.10 |
| CA034A | 3.02±0.20 | 1.50±0.20 | 0.55±0.05 | 0.30±0.15 | 0.50±0.15 | 0.80±0.15 | 0.30±0.20 |

4. 功率衰减曲线 (Derating Curve) :



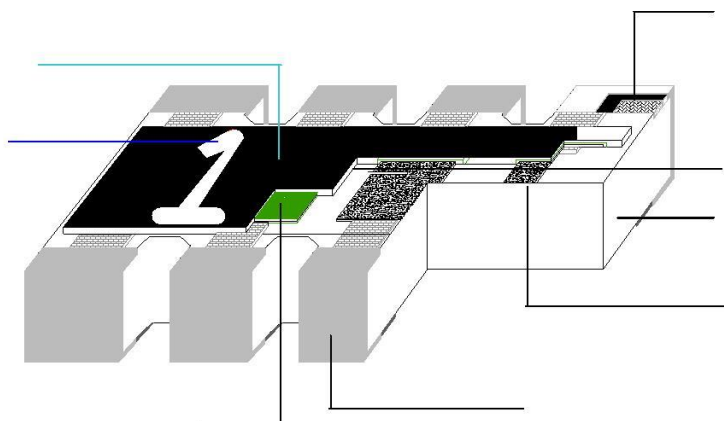
工作温度范围 (Operating Temperature Range) : -55°C~+155°C;

储存条件 (storage condition) : 5~30°C, 30~75%RH.

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5.电阻结构（Construction）：



| No. | 结构 construction | 主要材料 Major material |
|-----|--------------------------------|---|
| 1 | 陶瓷基板 Ceramic substrate | 三氧化二铝 Al ₂ O ₃ |
| 2 | 银电极 Conductive layer | 银 Ag |
| 3 | 阻体层 Resistive layer | 氧化钌+玻璃 RuO ₂ + glass |
| 4 | 内保护层 Inner protective layer | 玻璃 Glass |
| 5 | 外保护层 Outer Protective layer | 环氧树脂 Epoxy |
| 6 | 文字 Marking | 环氧树脂 Epoxy |
| 7 | 镍电极 Ni plating layer | 镍 Ni |
| 8 | 锡电极 Sn plating layer | 雾锡 Matte Tin |

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6. 阻值范围 (resistance range) :

| 型别 Type | 阻值范围 Resistance Range | | |
|---------|--------------------------|--------|--------|
| | 1% | 2% | 5% |
| CA024A | 1Ω~1MΩ | 1Ω~1MΩ | 1Ω~1MΩ |
| CA034A | 1Ω~1MΩ | 1Ω~1MΩ | 1Ω~1MΩ |

7. 电气特性 (electrical characteristics) :

| 型别 Type | CA024A | CA034A |
|---|--------|--------|
| 额定功率 Rated power | 1/16W | 1/10W |
| 最大工作电压 Max Working Voltage | 50V | 50V |
| 最大过负荷电压 Max Overload Voltage | 100V | 100V |
| 绝缘耐压 Dielectric Withstanding Voltage | 100V | 300V |
| 零欧姆电阻阻值 Resistance Value of Jumper | <50mΩ | <50mΩ |
| 零欧姆额定电流 Rated Current of Jumper | 1A | 1A |

备注 (remark) :

※ 额定电压计算公式 (The rated voltage is calculated by the following formula) :

$$E = \sqrt{RP}$$

E : 额定电压 (Rated Voltage) (V)

P : 额定功率 (Rated Power) (W)

R : 电阻阻值 (Resistance) (ohm)

※ 如果计算出的电压超过此型别的最大工作电压, 则此型别的最大工作电压为此电阻的额定电压。

In case the value calculated by the formula exceed the maximum working voltage as above table 7, the maximum working voltage shall be regarded as rated voltage.

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8. 性能(Performance Specifications)

| 内容 Item | 规格 Specification Limits | 测试方法 Test Methods |
|---|--|----------------------|
| 温度系数 Temperature Coefficient | 1Ω~10Ω产品 (Product) : -250~+500PPM/°C ±2%&±5%产品 (Product) : ±200 PPM/°C ±1%产品 (Product) : ±100 PPM/°C | JIS C 5201 4.8 |
| 焊锡性 Solderability | 最少 95%面积上锡(Min 95% coverage) | JIS C 5201 4.17 |
| 绝缘电阻 Insulation resistance | >10GΩ | JIS C 5201 4.6 |
| 绝缘耐压 Dielectric withstanding voltage | 无击穿、飞弧及可见机械性损伤 No evidence of flashover, mechanical damage arcing or insulation breakdown | JIS C 5201 4.7 |
| 短时间过负荷 Short-time overload | ±5%&±2% : ±(2.0% +0.05Ω) Max (最大) ±1%& : ±(1.0% +0.05Ω) Max (最大) | JIS C 5201 4.13 |
| 端子弯曲 Terminal bending | ±(1.0% +0.05Ω) Max (最大) | JIS C 5201 4.33 |
| 抗焊锡热 Resist to soldering heat | ±(1.0% +0.05Ω) Max (最大) | JIS C 5201 4.18 |
| 负荷寿命 Load life | ±(3.0% +0.05Ω) Max (最大) | JIS C 5201 4.25.1 |
| 耐湿特性 Humidity | ±(2.0% +0.05Ω) Max (最大) | JIS C 5201 4.24 |
| 温度循环 Temperature Cycling | ±(2.0% +0.05Ω) Max (最大) | JIS C 5201 4.19 |
| 温湿度敏感等级 Moisture sensitive level | Level 1 | J-STD-020 |
| 冷热冲击 Thermal shock | ±(1.0% +0.05Ω) Max (最大) | JIS C 5201 4.21 |

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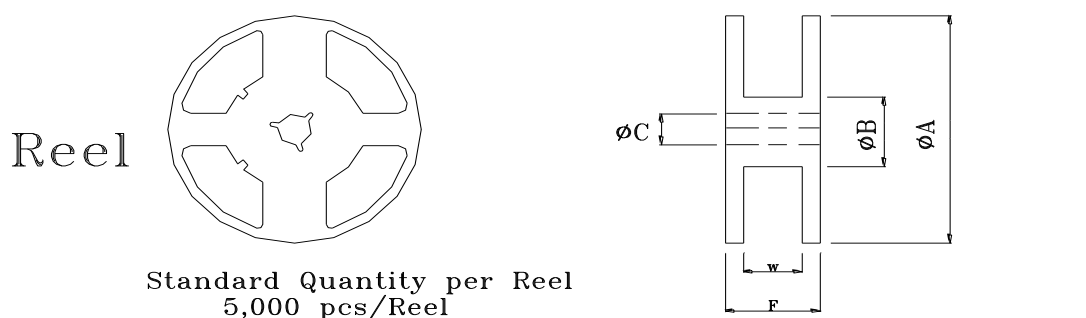
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9. 包装规格 (Tapping Specification)

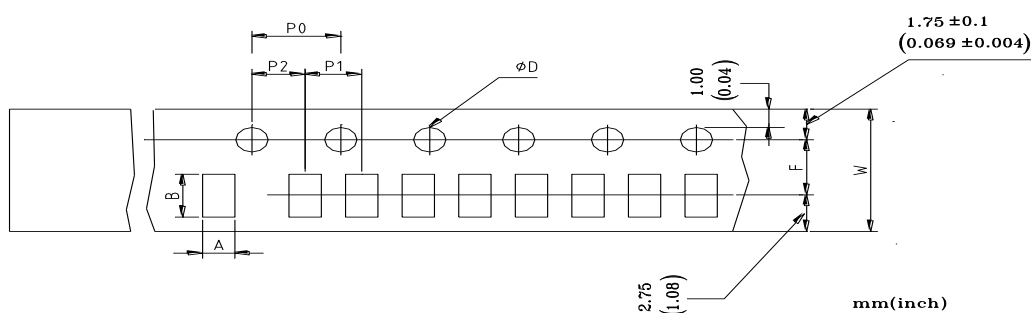
9.1 卷盘尺寸 (reel dimension)

| 尺寸 Dimensions | | A | B | C | F | W |
|------------------|------|-------------|-------------|-------------|-------------|-------------|
| CA024A CA034A | mm | 178±2.0 | 60.0±1.0 | 13.5±0.5 | 11.4±0.1 | 9.00±0.3 |
| | Inch | 7.008±0.079 | 2.362±0.039 | 0.531±0.020 | 0.449±0.039 | 0.354±0.012 |

- ※ 备注 (Remark) : (1)CA024A 每卷 10,000 pcs
 CA024A Quantity per Reel 10,000 pcs/Reel
 (2)CA034A 每卷 5,000 pcs
 CA034A Quantity per Reel 5,000 pcs/Reel



9.2 包装尺寸 (packing dimension)



Unit: mm

| Dimensions | A | B | D | F | P0 | P1 | P2 | W |
|------------|-----------|-----------|-------------------------------------|-----------|-----------|-----------|-----------|-----------|
| CA024A | 1.20±0.10 | 2.20±0.10 | 1.50± _{0.0} ^{0.1} | 3.50±0.05 | 4.00±0.10 | 4.00±0.10 | 2.00±0.05 | 8.00±0.20 |
| CA034A | 1.90±0.15 | 2.40±0.20 | 1.50± _{0.0} ^{0.1} | 3.50±0.05 | 4.00±0.10 | 4.00±0.10 | 2.00±0.05 | 8.00±0.20 |

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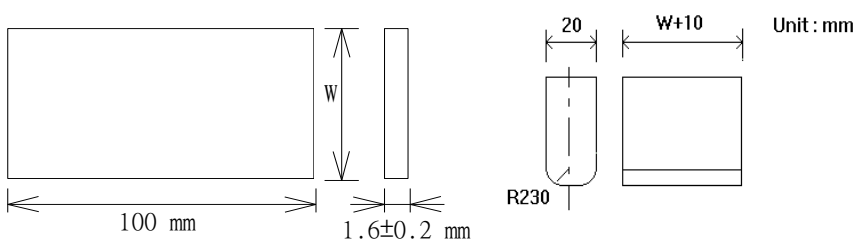
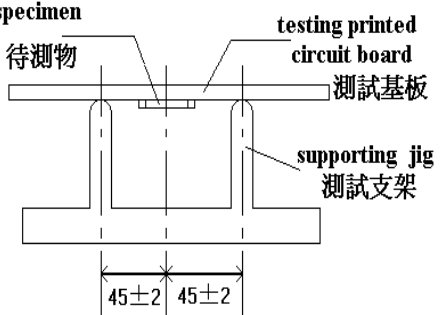
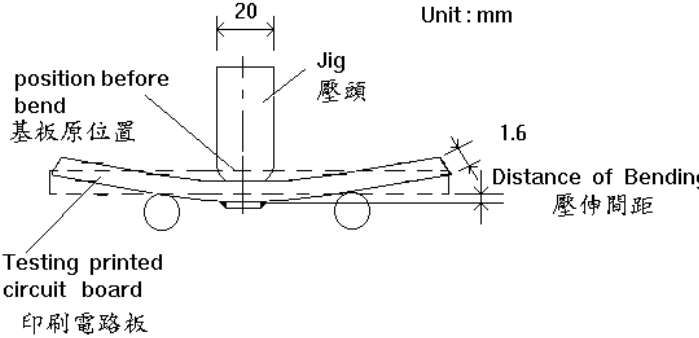
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10. 信赖性测试 (Reliability Test Methods)

| 内容 Item | 测试条件 Test Conditions |
|---|--|
| 温度系数 Temperature Coefficient | $TCR = (R - R_0) / (t - t_0) R_0 \times 10^6 \text{ (ppm)}$ R_0 电阻在室温下的阻值(resistance at room temperature) R 电阻在 125℃ 或 -55℃ 下的阻值(resistance at 125℃ or -55℃) t_0 室温(room temperature) t 测试温度 (test temperature 125℃ or -55℃) |
| 焊锡性 Solderability | 沾助焊剂后浸入锡炉，锡炉温度 245±5℃，时间 2~3 秒 Dip the terminal in a flux and then dip into a soldering bath at 245±5℃ for 2~3sec. |
| 绝缘电阻 Insulation resistance | 电阻本体上加载最大的工作电压 60 秒后，测量绝缘阻抗 Applied the maximum DC working voltage on the center of body for 60 ±5seconds. Then measure insulation resistance |
| 绝缘耐压 Dielectric withstanding voltage | 电阻本体上加载最大的工作电压 60 秒。 Applied the maximum DC working voltage on the center of body for 60 ±5seconds. |
| 短时间过负荷 Short-time overload | 加载 2.5 倍的额定电压，时间 5 秒后测量试验前后的阻值变化率。 Applied 2.5 times of rated voltage for 5 second. Measure the variation of resistance. $\Delta R\% = \frac{R_2 - R_1}{R_1} * 100 \text{----- (\%)}$ $R_1 = \text{试验前阻值(resistance before test)}$ $R_2 = \text{试验后阻值(resistance after test)}$ |
| 抗焊锡热 Resist to soldering heat | 沾助焊剂后浸入锡炉，锡炉温度 260±5℃，时间 10±0.5 秒，测量试验前后的阻值变化率。 Dip the terminal in a flux and then dip into a soldering bath at 260±5℃ for 10±0.5sec. Measure the variation of resistance. $\Delta R\% = \frac{R_2 - R_1}{R_1} * 100 \text{----- (\%)}$ $R_1 = \text{试验前阻值(resistance before test)}$ $R_2 = \text{试验后阻值(resistance after test)}$ |

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| 内容 Item | 测试条件 Test Conditions |
|--------------------------|---|
| 端子弯曲 Terminal bending | <p>电阻焊接在测试板上进行弯折,弯折保持时间 5 ± 1 秒, 弯曲 $5^{+0.2}/\%$ mm; 量测试前后阻值变化率</p> <p>Specimen shall be mounted on test board, then bend the board and maintained for 5 ± 1 s, the distance of bending is $5^{+0.2}/\%$ mm, Measure the variation of resistance.</p> <p>测试板 (test board) 压头 (jig)</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;">  <div style="text-align: right;">Unit: mm</div> </div> <p>specimen testing printed circuit board 待测物 测试基板</p>  <p>supporting jig 测试支架</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;">  <div style="text-align: right;">Unit: mm</div> </div> <p>position before bend 基板原位置</p> <p>Testing printed circuit board 印刷电路板</p> <p>Jig 壓頭</p> <p>Distance of Bending 壓伸間距</p> $\Delta R\% = \frac{R_2 - R_1}{R_1} * 100 \text{-----} (\%)$ <p>R1 = 试验前阻值(resistance before test) R2 = 试验后阻值(resistance after test)</p> |

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| 内容 Item | 测试条件 Test Conditions |
|-------------------------------------|---|
| 负荷寿命 Load life | <p>电阻放入恒温箱中，温度 $70\pm 2^{\circ}\text{C}$，通电额定电压 $1000^{+24}/_{-0}$ 小时，量测试验前后阻值变化率。</p> <p>Put the specimen in a chamber at $70\pm 2^{\circ}\text{C}$ temperature, and applied rated voltage for $1000^{+24}/_{-0}\text{H}$. Measure the variation of resistance.</p> $\Delta R\% = \frac{R_2 - R_1}{R_1} * 100 \text{-----} (\%)$ <p>R1 = 试验前阻值(resistance before test) R2 = 试验后阻值(resistance after test)</p> |
| 耐湿特性 Humidity | <p>电阻放入恒温恒湿箱，温度 $40\pm 2^{\circ}\text{C}$，湿度 90~95 %RH;通电额定电压 1.5 小时，断电 0.5 小时；重复通断电至试验时间 $1000^{+48}/_{-0}$ 小时。量测试验前后阻值变化率。</p> <p>Put the specimen in a chamber at $40\pm 2^{\circ}\text{C}$ temperature and 90~95% relative humidity, then applied rated voltage for 1.5H and rested for 0.5H repeatedly till total test time is $1000^{+48}/_{-0}$. Measure the variation of resistance.</p> $\Delta R\% = \frac{R_2 - R_1}{R_1} * 100 \text{-----} (\%)$ <p>R1 = 试验前阻值(resistance before test) R2 = 试验后阻值(resistance after test)</p> |
| 温湿度敏感等级 Moisture sensitive level | <p>电阻放入恒温恒湿箱，温度 85°C，湿度 90~95 %RH;时间 168 小时，再进行回流焊测试</p> <p>Put the specimen in a chamber at 85°C temperature and 85% relative humidity for 168H, then apply reflow test</p> |
| 冷热冲击 Thermal shock | <p>电阻放入冷热冲击机中，温度 $125\pm 2^{\circ}\text{C}$ 至 $-55\pm 3^{\circ}\text{C}$，共 5 个循环。量测试验前后阻值变化率。</p> <p>Put specimen in a chamber which temperature can be changed to $125\pm 2^{\circ}\text{C}$ or $-55\pm 3^{\circ}\text{C}$, repeated 5 times. Measure the variation of resistance.</p> $\Delta R\% = \frac{R_2 - R_1}{R_1} * 100 \text{-----} (\%)$ <p>R1 = 试验前阻值(resistance before test) R2 = 试验后阻值(resistance after test)</p> |

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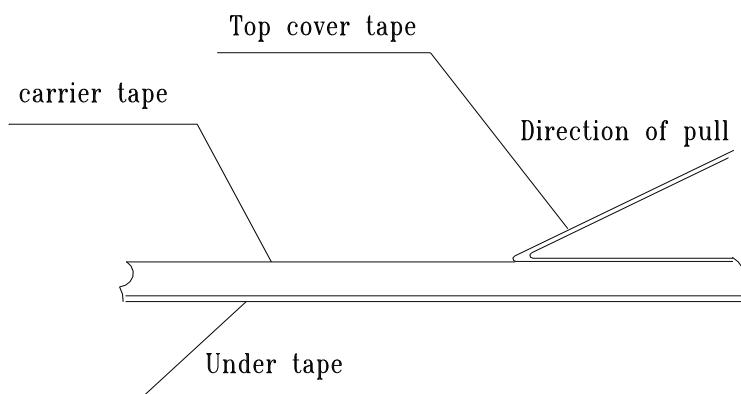
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| 内容 Item | 测试条件 Test Conditions | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------------|--|------------------------|------------------------------------|----------------------------------|----------------------------------|-------|-------|-----------------|--------|--------|--------|--------|--------|-------------------|----------------------------------|-----|----------------------------------|----------------------------------|-----|------------|------|----|------|------|----|------------------------|-------|-------|-------|-------|--------|-----------------|--------|--------|--------|--------|--------|-------------------|----------------------------------|-----|------------------------------------|------|----------------------------------|------------|------|----|------|----|------|
| 温度循环 Temperature Cycling | <p>电阻放入恒温恒湿箱，加载额定电压，温湿度条件如下表；循环测试 42 次，测试时间 1000 小时. 量测试前后阻值变化率.</p> <p>Put specimen in a chamber and applied rated voltage. Temperature and humidity conditions as following. There are 42 cycles and total test time is 1000H. Measure the variation of resistance.</p> <p>表 1（table1）</p> <table><tr><td>测试条件 test condition</td><td>step1</td><td>step2</td><td>step3</td><td>step4</td><td>step5</td></tr><tr><td>湿度% humidity</td><td>90～96%</td><td>90～96%</td><td>80～96%</td><td>90～96%</td><td>90～96%</td></tr><tr><td>温度 temperature</td><td>升温至 65℃ increase to 65℃</td><td>65℃</td><td>降温至 25℃ decrease to 25℃</td><td>升温至 65℃ increase to 65℃</td><td>65℃</td></tr><tr><td>时间 time</td><td>2.5H</td><td>3H</td><td>2.5H</td><td>2.5H</td><td>3H</td></tr></table> <table><tr><td>测试条件 test condition</td><td>step6</td><td>step7</td><td>step8</td><td>step9</td><td>step10</td></tr><tr><td>湿度% humidity</td><td>80～96%</td><td>90～96%</td><td>90～96%</td><td>90～96%</td><td>90～96%</td></tr><tr><td>温度 temperature</td><td>降温至 25℃ decrease to 25℃</td><td>25℃</td><td>降温至 -10℃ decrease to -10℃</td><td>-10℃</td><td>升温至 25℃ increase to 25℃</td></tr><tr><td>时间 time</td><td>2.5H</td><td>2H</td><td>0.5H</td><td>3H</td><td>0.5H</td></tr></table> $\Delta R\% = \frac{R_2 - R_1}{R_1} * 100 \text{-----（ \% ）}$ <p>R1 = 试验前阻值(resistance before test) R2 = 试验后阻值(resistance after test)</p> | 测试条件 test condition | step1 | step2 | step3 | step4 | step5 | 湿度% humidity | 90～96% | 90～96% | 80～96% | 90～96% | 90～96% | 温度 temperature | 升温至 65℃ increase to 65℃ | 65℃ | 降温至 25℃ decrease to 25℃ | 升温至 65℃ increase to 65℃ | 65℃ | 时间 time | 2.5H | 3H | 2.5H | 2.5H | 3H | 测试条件 test condition | step6 | step7 | step8 | step9 | step10 | 湿度% humidity | 80～96% | 90～96% | 90～96% | 90～96% | 90～96% | 温度 temperature | 降温至 25℃ decrease to 25℃ | 25℃ | 降温至 -10℃ decrease to -10℃ | -10℃ | 升温至 25℃ increase to 25℃ | 时间 time | 2.5H | 2H | 0.5H | 3H | 0.5H |
| 测试条件 test condition | step1 | step2 | step3 | step4 | step5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 湿度% humidity | 90～96% | 90～96% | 80～96% | 90～96% | 90～96% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 温度 temperature | 升温至 65℃ increase to 65℃ | 65℃ | 降温至 25℃ decrease to 25℃ | 升温至 65℃ increase to 65℃ | 65℃ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 时间 time | 2.5H | 3H | 2.5H | 2.5H | 3H | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 测试条件 test condition | step6 | step7 | step8 | step9 | step10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 湿度% humidity | 80～96% | 90～96% | 90～96% | 90～96% | 90～96% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 温度 temperature | 降温至 25℃ decrease to 25℃ | 25℃ | 降温至 -10℃ decrease to -10℃ | -10℃ | 升温至 25℃ increase to 25℃ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 时间 time | 2.5H | 2H | 0.5H | 3H | 0.5H | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

11. 上胶带剥离力测试 (Peel force of top cover tape)

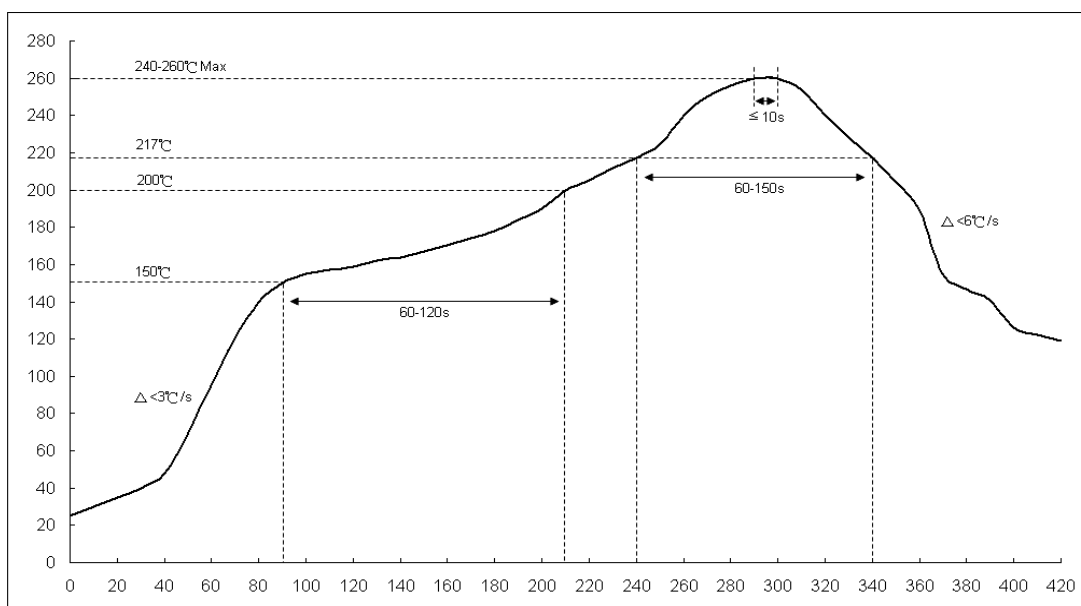
上胶带以 200mm/分钟的速度，沿 165~180 度角的方向进行剥离，如下图所示。纸带的剥离力范围为 10g~70g。

The top cover tape is pulled at a speed of 200 mm/min with the angle between the tape during peel and the direction of unreeling maintained at 165 to 180 degree as following picture. The peel force of paper carrier tape shall be 0.1N to 0.7N(10 to 70 g).

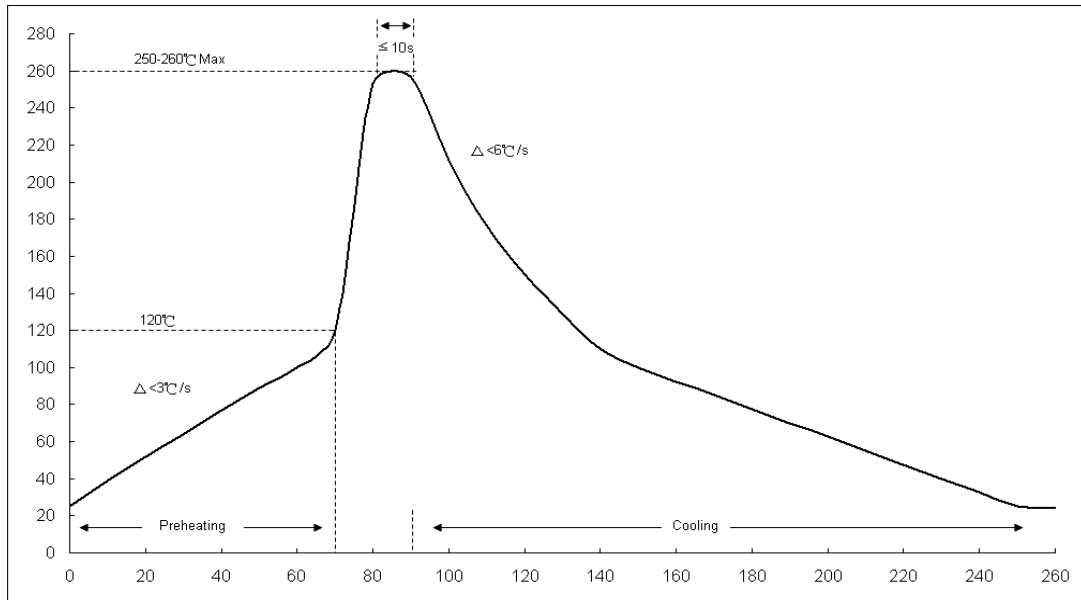


12. 焊接 (soldering)

12.1 建议回流焊曲线 (Recommend reflow soldering profile)



12.2 建议波峰焊曲线 (Recommend wave soldering profile)



12.3 手工焊温度 (hand soldering temperature)

烙鐵溫度 $350 \pm 10^{\circ}\text{C}$ 3 秒之內，避免烙鐵接觸電阻本體

The iron temperature is $350 \pm 10^{\circ}\text{C}$, hand soldering time less than 3S. Avoid solder iron tip direct touch the components body