

承认书

APPROVAL SHEET

厂商：丽智电子（昆山）有限公司

客户： _____

：丽智电子（南通）有限公司

Supplier:

customer:

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厚膜贴片排阻承认书-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、无卤之厚膜贴片排阻 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贴片电阻端电极无铅，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) :

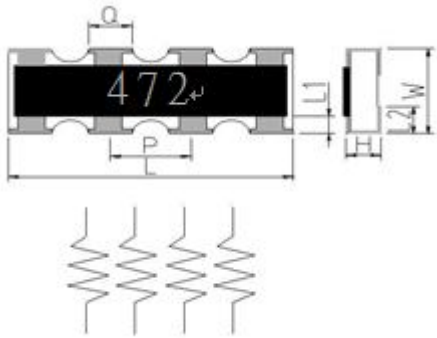
8P4R (0603) 1/10W 5% 1K Ω
 CA034AJA0102G

<u>CA</u>	<u>034A</u>	<u>J</u>	<u>A</u>	<u>0102</u>	<u>G</u>
类型(Type) CA: 厚膜贴片 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)

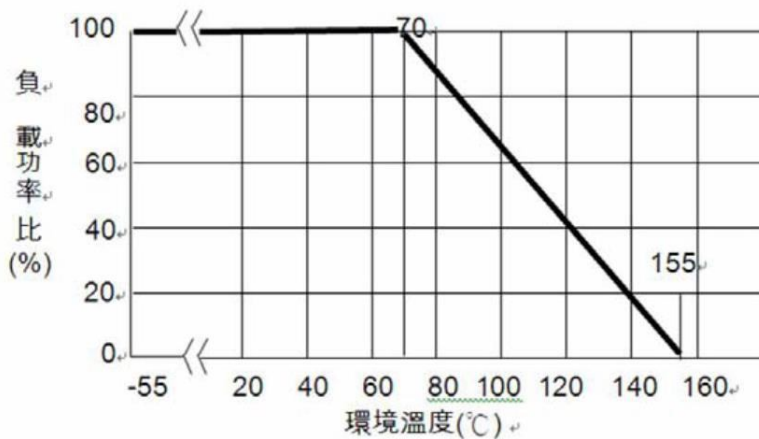
厚膜贴片排阻承认书-CA 系列

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

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	3.20±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

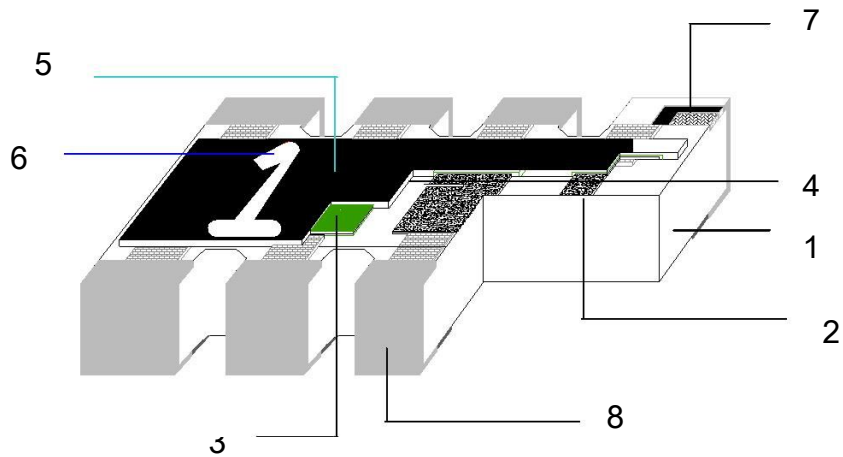
4. 功率衰减曲线 (Derating Curve) :



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.

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

厚膜贴片排阻承认书-CA 系列

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

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	220V	430V
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.

厚膜贴片排阻承认书-CA 系列

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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 ≤ R ≤ 10Ω 产品 (Product) : -200~+400PPM/°C 10Ω < R ≤ 1MΩ 产品 (Product) : ±200 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
温湿循环 Moisture Resistance	±(2.0% +0.05Ω) Max (最大)	MIL-STD-202 METHOD 106

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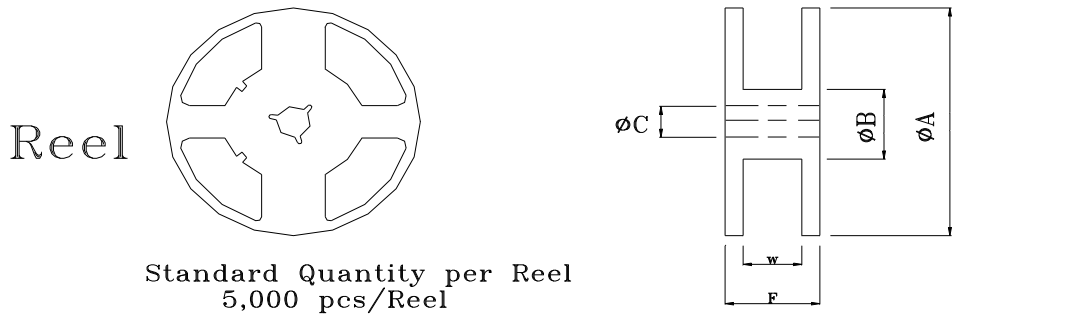
Approval Specification for Thick Film Chip Array Resistors - Type **CA**

9. 包装规格 (Tapping Specification)

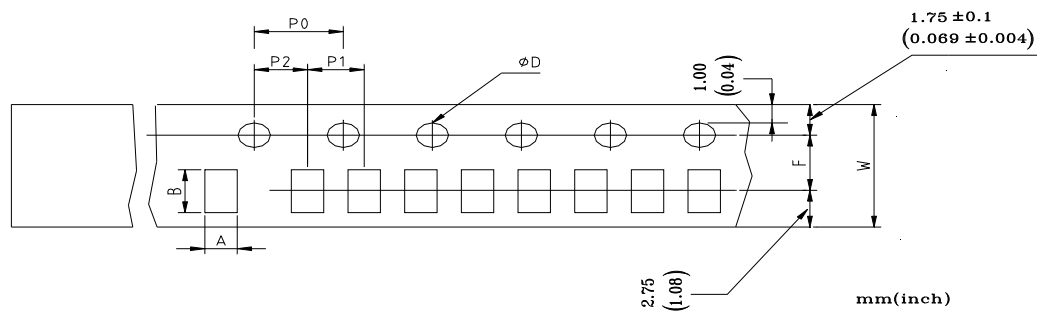
9.1 卷盘尺寸 (reel dimension)

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	3.40±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

厚膜贴片排阻承认书-CA 系列

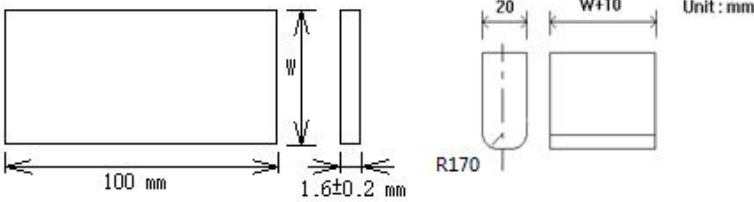
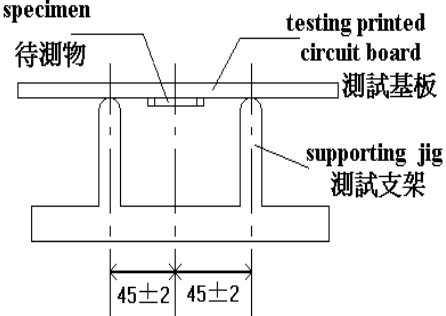
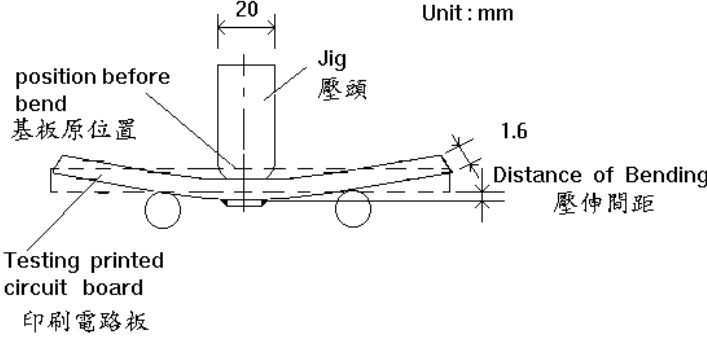
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10. 信赖性测试 (Reliability Test Methods)

内容 Item	测试条件 Test Conditions
温度系数 Temperature Coefficient	$TCR = (R - R_0) / (t - t_0) R_0 \times 10^6 \text{ (ppm)}$ <p> R_0 电阻在室温下的阻值(resistance at room temperature) R 电阻在 125°C 或 -55°C 下的阻值(resistance at 125°C or -55°C) t_0 室温(room temperature) t 测试温度 (test temperature 125°C or -55°C) </p>
焊锡性 Solderability	沾助焊剂后浸入锡炉，锡炉温度 245±5°C，时间 2~3 秒 Dip the terminal in a flux and then dip into a soldering bath at 245±5°C for 2~3sec.
绝缘电阻 Insulation resistance	电阻本体上加载最大的工作电压 60±5 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±5 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. $\Delta R\% = \frac{R_2 - R_1}{R_1} * 100 \text{----- (\%)}$ <p> R_1 = 试验前阻值(resistance before test) R_2 = 试验后阻值(resistance after test) </p>
抗焊锡热 Resist to soldering heat	沾助焊剂后浸入锡炉，锡炉温度 260±5°C，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°C for 10±0.5sec. Measure the variation of resistance. $\Delta R\% = \frac{R_2 - R_1}{R_1} * 100 \text{----- (\%)}$ <p> R_1 = 试验前阻值(resistance before test) R_2 = 试验后阻值(resistance after test) </p>

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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 20±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 20±1s,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="text-align: center;">  <p>Unit: mm</p> </div> <div style="text-align: center;">  <p>Unit: mm</p> </div> <div style="text-align: center;">  <p>Unit: mm</p> </div> $\Delta R\% = \frac{R_2 - R_1}{R_1} * 100 \text{-----} (\%)$ <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>
温度循环 Temperature Cycling	<p>电阻放入温度循环机中，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>

厚膜贴片排阻承认书-CA 系列

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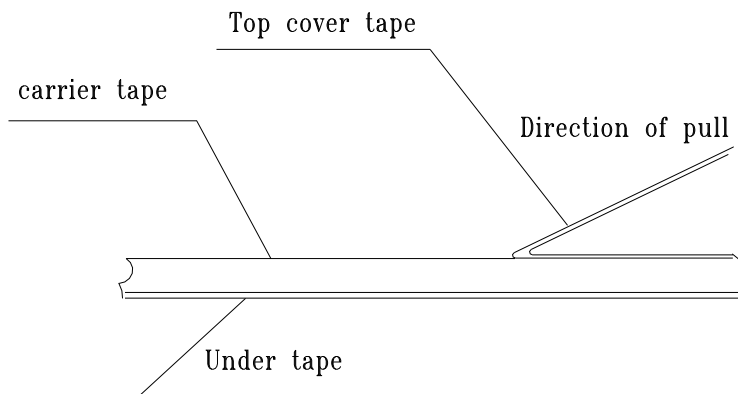
内容 Item	测试条件 Test Conditions																																																
温湿循环 Moisture Resistance	<p>电阻放入恒温恒湿箱，加载额定电压，温湿度条件如下表；循环测试 42 次，测试时间 1000 小时。量测试前后阻值变化率。 Put specimen in a chamber and applied rated voltage. Temperature and humidity conditions as following. There are 42 cycles and total test time is 1000H. Measure the variation of resistance.</p> <p style="text-align: center;">表 1 (table1)</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <thead> <tr> <th style="width: 15%;">测试条件 test condition</th> <th style="width: 15%;">step1</th> <th style="width: 15%;">step2</th> <th style="width: 15%;">step3</th> <th style="width: 15%;">step4</th> <th style="width: 15%;">step5</th> </tr> </thead> <tbody> <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> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <thead> <tr> <th style="width: 15%;">测试条件 test condition</th> <th style="width: 15%;">step6</th> <th style="width: 15%;">step7</th> <th style="width: 15%;">step8</th> <th style="width: 15%;">step9</th> <th style="width: 15%;">step10</th> </tr> </thead> <tbody> <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> </tbody> </table> <p style="text-align: center;"> $\Delta R\% = \frac{R_2 - R_1}{R_1} * 100 \text{-----} (\%)$ </p> <p style="text-align: center;"> 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
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时间 time	2.5H	2H	0.5H	3H	0.5H																																												

Approval Specification for Thick Film Chip Array Resistors - Type CA

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

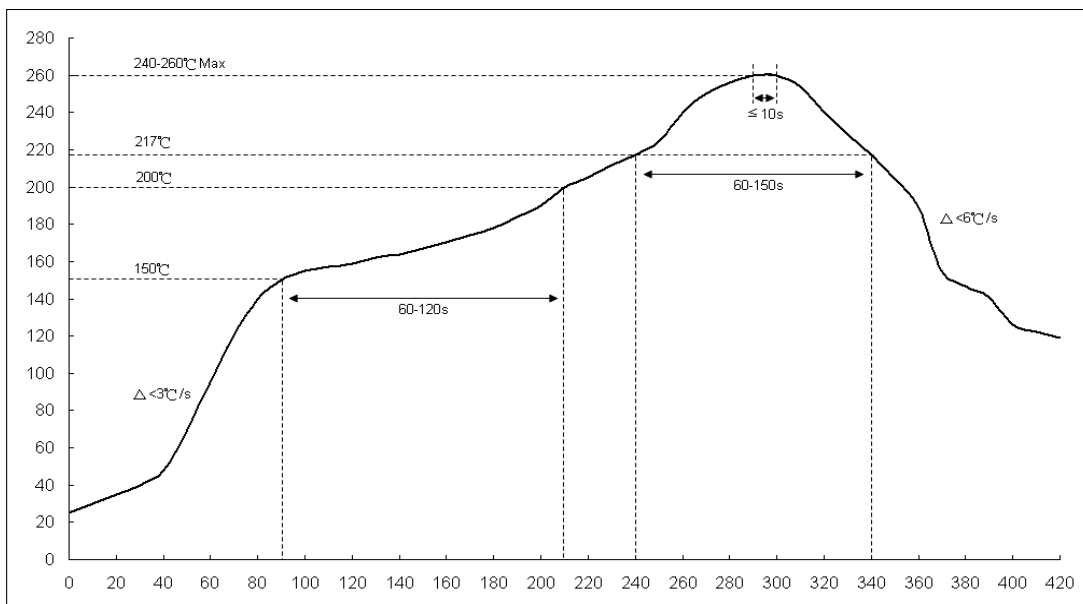
上胶带以 200mm/分钟的速度，沿 165~180 度角的方向进行剥离，如下图所示。纸带的剥离力范围为 10g~70g.

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).



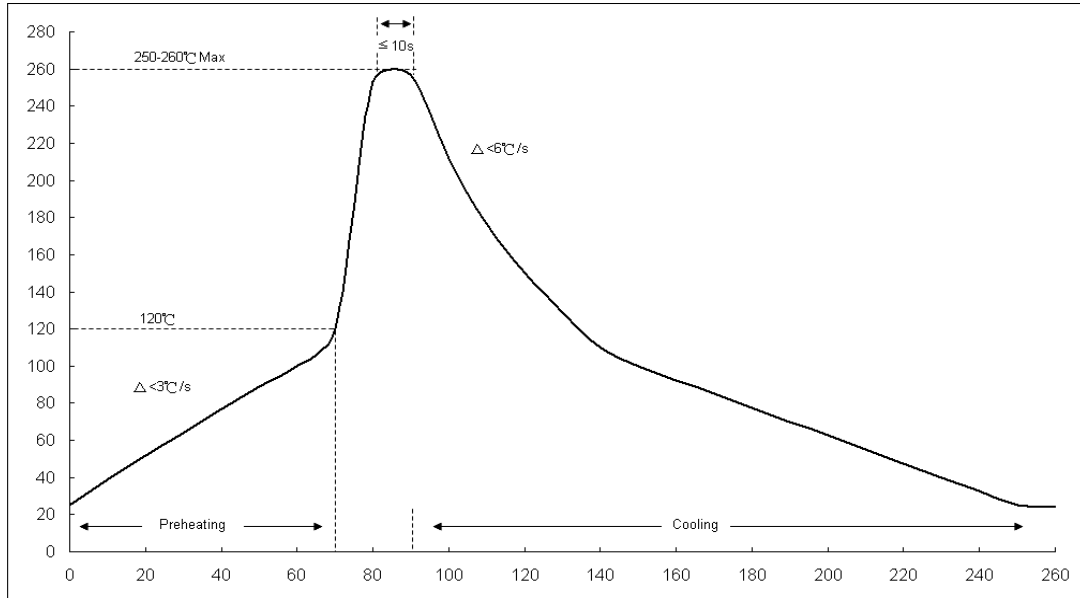
12. 焊接 (soldering)

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



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

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