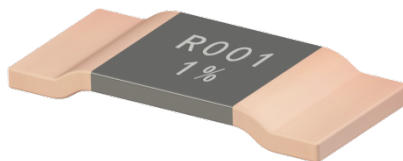


■ 纯合金高功率贴片电阻 (Pure Alloy High Power Chip Resistor)



■ 特点 (Features)

- Electron beam welding process
- Low thermal electromotive force
- Low Resistance and High Accuracy Resistor for Current Detection
- Low inductance
- Low temperature coefficient
- Complies with AEC-Q200 reliability test
- Pb-free to Meet RoHS 、Reach Requirements
- Special specifications can be customized
- 电子束焊接工艺
- 低热电动势
- 用于电流检测的低电流，高精度电阻
- 低电感
- 低温度系数
- 符合 AEC-Q200 可靠性测试
- 无铅，符合 RoHS、Reach 要求
- 特殊规格可定制

■ 应用 (Application)

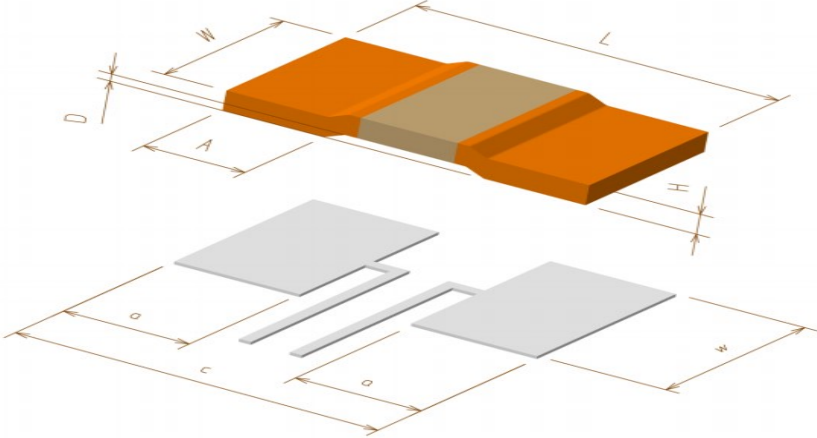
- DC-DC Converter , Battery Pack, Charge, Adaptor
- Industrial instruments and equipment
- Automation Control Power Supply
- Variable frequency drives and servo drive systems
- Current sensing
- power management system
- Automotive electronic control system
- DC-DC 转换器，电池组，充电，适配器
- 工业仪器设备
- 自动化控制电源
- 变频驱动与伺服驱动系统
- 电流检测
- 电源管理系统
- 汽车电子控制系统

■ 料号说明 (Parts Number Explanation) :

示例 Example: FCM25125WFR001TM

| FCM<br>系列  | 2512<br>型别           | 3W<br>功率                  | F<br>公差                            | R001<br>字码             | I<br>包装别                                   | M<br>材质                                      | 特殊型             |
|------------|----------------------|---------------------------|------------------------------------|------------------------|--------------------------------------------|----------------------------------------------|-----------------|
| FOSAN Type | 2512<br>3920<br>5930 | 3W:3W<br>7W:7W<br>15W:15W | D:±0.5%<br>F:±1%<br>G:±2%<br>J:±5% | R001=1mΩ<br>0M50=0.5mΩ | T: 7 inch reel<br>R:13 inch reel<br>B:Bulk | M: CuMn<br>S: CuMnSn<br>K: Karma<br>F:FeCrAl | Blank: none     |
| Type code  | Size code            | Power<br>code             | Tolerance code                     | Resistance code        | Packaging code                             | Termination<br>code                          | Special<br>code |

产品尺寸与推荐焊盘尺寸 (Product Dimension & Recommended Pad Dimension)

| <div> <div>产品尺寸与焊盘尺寸</div> <div>Product Dimension &amp; Pad Dimension</div> </div> <div>  </div> <div>单位 (unit) : mm</div> |                    |                     |               |     |     |                   |         |         |         |          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------------|---------------|-----|-----|-------------------|---------|---------|---------|----------|
| 型别<br>(Size)                                                                                                                                                                                                 | Resistance<br>(mΩ) | Element<br>Material | Pad Dimension |     |     | Product Dimension |         |         |         |          |
|                                                                                                                                                                                                              |                    |                     | c             | w   | a   | L                 | W       | A       | D       | H (±0.1) |
| 2512                                                                                                                                                                                                         | 0.2                | CuMnSn              | 7             | 3.4 | 1.8 | 6.3±0.2           | 3.1±0.3 | 1.2±0.2 | 0.5±0.1 | 1.40     |
|                                                                                                                                                                                                              | 0.3                | CuMnSn              |               |     |     |                   |         |         |         | 0.90     |
|                                                                                                                                                                                                              | 0.3                | CuMn                |               |     |     |                   |         |         |         | 1.50     |
|                                                                                                                                                                                                              | 0.5                | CuMn                |               |     |     |                   |         |         |         | 0.93     |
|                                                                                                                                                                                                              | 1.0                | CuMn                |               |     |     |                   |         |         |         | 0.45     |
|                                                                                                                                                                                                              | 1.5                | Karma/FeCrAl        |               |     |     |                   |         |         |         | 0.86     |
|                                                                                                                                                                                                              | 2.0                | Karma/FeCrAl        |               |     |     |                   |         |         |         | 0.65     |
|                                                                                                                                                                                                              | 2.5                | Karma/FeCrAl        |               |     |     |                   |         |         |         | 0.50     |
|                                                                                                                                                                                                              | 3.0                | Karma/FeCrAl        |               |     |     |                   |         |         |         | 0.43     |
|                                                                                                                                                                                                              | 4.0                | Karma/FeCrAl        |               |     |     |                   |         |         |         | 0.31     |
|                                                                                                                                                                                                              | 5.0                | Karma/FeCrAl        |               |     |     |                   |         |         |         | 0.28     |
| 3920                                                                                                                                                                                                         | 0.2                | CuMn                | 11            | 6.2 | 2.7 | 10±0.2            | 5.1±0.4 | 2.2±0.2 | 0.5±0.1 | 1.64     |
|                                                                                                                                                                                                              | 0.3                | CuMn                |               |     |     |                   |         |         |         | 1.37     |
|                                                                                                                                                                                                              | 0.4                | CuMn                |               |     |     |                   |         |         |         | 0.97     |
|                                                                                                                                                                                                              | 0.5                | CuMn                |               |     |     |                   |         |         |         | 0.83     |
|                                                                                                                                                                                                              | 0.7                | CuMn                |               |     |     |                   |         |         |         | 0.55     |
|                                                                                                                                                                                                              | 1                  | CuMn                |               |     |     |                   |         |         |         | 0.40     |
|                                                                                                                                                                                                              | 1                  | Karma/FeCrAl        |               |     |     |                   |         |         |         | 1.16     |
|                                                                                                                                                                                                              | 1.5                | Karma/FeCrAl        |               |     |     |                   |         |         |         | 0.75     |
|                                                                                                                                                                                                              | 2.0                | Karma/FeCrAl        |               |     |     |                   |         |         |         | 0.56     |
|                                                                                                                                                                                                              | 2.5                | Karma/FeCrAl        |               |     |     |                   |         |         |         | 0.47     |
|                                                                                                                                                                                                              | 3.0                | Karma/FeCrAl        |               |     |     |                   |         |         |         | 0.37     |
|                                                                                                                                                                                                              | 4.0                | Karma/FeCrAl        |               |     |     |                   |         |         |         | 0.28     |
|                                                                                                                                                                                                              | 5.0                | Karma/FeCrAl        |               |     |     |                   |         |         |         | 0.28     |

| 型别<br>(Size) | Resistance<br>(mΩ) | Element<br>Material | Pad Dimension |      |     | Product Dimension |         |         |         |          |
|--------------|--------------------|---------------------|---------------|------|-----|-------------------|---------|---------|---------|----------|
|              |                    |                     | c             | w    | a   | L                 | W       | A       | D       | H (±0.1) |
| 5930         | 0.1                | CuMnSn              | 16            | 8.75 | 5.2 | 15±0.3            | 7.6±0.4 | 4.2±0.3 | 0.5±0.1 | 2.00     |
|              | 0.2                | CuMn                |               |      |     |                   |         |         |         | 1.50     |
|              | 0.3                | CuMn                |               |      |     |                   |         |         |         | 0.80     |
|              | 0.5                | CuMn                |               |      |     |                   |         |         |         | 0.60     |
|              | 1.0                | Karma/FeCrAl        |               |      |     |                   |         |         |         | 0.86     |
|              | 1.5                | Karma/FeCrAl        |               |      |     |                   |         |         |         | 0.61     |
|              | 2.0                | Karma/FeCrAl        |               |      |     |                   |         |         |         | 0.40     |
|              | 2.5                | Karma/FeCrAl        |               |      |     |                   |         |         |         | 0.34     |
|              | 3.0                | Karma/FeCrAl        |               |      |     |                   |         |         |         | 0.29     |

■ 电气特性 (Electrical characteristics)

| 型别<br>Type | 阻值<br>Resistance<br>(mΩ) | 材质<br>Element Material | T.C.R.<br>(PPM/°C) | 额定功率<br>Power Rating<br>at P70 (W) | 精度<br>Tolerance<br>(%) | 使用温度范围<br>Operating Temperature<br>(°C) |
|------------|--------------------------|------------------------|--------------------|------------------------------------|------------------------|-----------------------------------------|
| 2512       | 0.2                      | CuMnSn                 | ±175               | 6                                  | ±0.5%、±1%、±2%、±5%      | -55~170                                 |
|            | 0.3                      | CuMnSn                 | ±175               | 6                                  |                        |                                         |
|            | 0.3                      | CuMn                   | ±175               | 6                                  |                        |                                         |
|            | 0.5                      | CuMn                   | ±120               | 6                                  |                        |                                         |
|            | 1.0                      | CuMn                   | ±100               | 5                                  |                        |                                         |
|            | 1.5                      | Karma/FeCrAl           | ±50                | 6                                  |                        |                                         |
|            | 2.0                      | Karma/FeCrAl           | ±50                | 5                                  |                        |                                         |
|            | 2.5                      | Karma/FeCrAl           | ±50                | 4                                  |                        |                                         |
|            | 3.0                      | Karma/FeCrAl           | ±50                | 4                                  |                        |                                         |
|            | 4.0                      | Karma/FeCrAl           | ±50                | 3                                  |                        |                                         |
|            | 5.0                      | Karma/FeCrAl           | ±50                | 3                                  |                        |                                         |
| 3920       | 0.2                      | CuMn                   | ±200               | 12                                 |                        |                                         |
|            | 0.3                      | CuMn                   | ±150               | 10                                 |                        |                                         |
|            | 0.4                      | CuMn                   | ±100               | 9                                  |                        |                                         |
|            | 0.5                      | CuMn                   | ±70                | 9                                  |                        |                                         |
|            | 0.7                      | CuMn                   | ±70                | 8                                  |                        |                                         |
|            | 1                        | CuMn                   | ±70                | 7                                  |                        |                                         |
|            | 1                        | Karma/FeCrAl           | ±50                | 8                                  |                        |                                         |
|            | 1.5                      | Karma/FeCrAl           | ±50                | 6                                  |                        |                                         |
|            | 2.0                      | Karma/FeCrAl           | ±50                | 6                                  |                        |                                         |
|            | 2.5                      | Karma/FeCrAl           | ±50                | 5                                  |                        |                                         |
|            | 3.0                      | Karma/FeCrAl           | ±50                | 5                                  |                        |                                         |
|            | 4.0                      | Karma/FeCrAl           | ±50                | 5                                  |                        |                                         |
|            | 5.0                      | Karma/FeCrAl           | ±50                | 4                                  |                        |                                         |

| 型别<br>Type | 阻值<br>Resistance<br>(mΩ) | 材质<br>Element Material | T.C.R.<br>(PPM/°C) | 额定功率<br>Power Rating<br>at P70 (W) | 精度<br>Tolerance<br>(%) | 使用温度范围<br>Operating Temperature<br>(°C) |
|------------|--------------------------|------------------------|--------------------|------------------------------------|------------------------|-----------------------------------------|
| 5930       | 0.1                      | CuMnSn                 | ±200               | 15                                 | ±0.5%、±1%、±2%、±5%      | -55~170                                 |
|            | 0.2                      | CuMn                   | ±100               | 15                                 |                        |                                         |
|            | 0.3                      | CuMn                   | ±75                | 10                                 |                        |                                         |
|            | 0.5                      | CuMn                   | ±75                | 10                                 |                        |                                         |
|            | 1.0                      | Karma/FeCrAl           | ±50                | 9                                  |                        |                                         |
|            | 1.5                      | Karma/FeCrAl           | ±50                | 8                                  |                        |                                         |
|            | 2.0                      | Karma/FeCrAl           | ±50                | 7                                  |                        |                                         |
|            | 2.5                      | Karma/FeCrAl           | ±50                | 7                                  |                        |                                         |
|            | 3.0                      | Karma/FeCrAl           | ±50                | 7                                  |                        |                                         |

如有非标准品的需求,请联系我们的业务部门 For non-standard parts, please contact our sales dept.

### ■ 印字标识 (Marking)

The resistance value of the product is expressed in two ways:

- The decimal point of  $\Omega$  is indicated by the character "R".
- Using "m" to indicate the decimal point of mΩ.

E.g.,

R001 1%=1mΩ 1%;

0m50 1%=0.5mΩ 1%; 2m50 1%=2.5mΩ 1%

产品阻值使用两种方式表示:

- 以 "R" 字指示  $\Omega$  的小数点的位置
- 以 "m" 字指示 mΩ 的小数点的位置

例:

R001 1%=1mΩ 1%;

0m50 1%=0.5mΩ 1%; 2m50 1%=2.5mΩ 1%

### ■ 性能 (Performance Specifications)

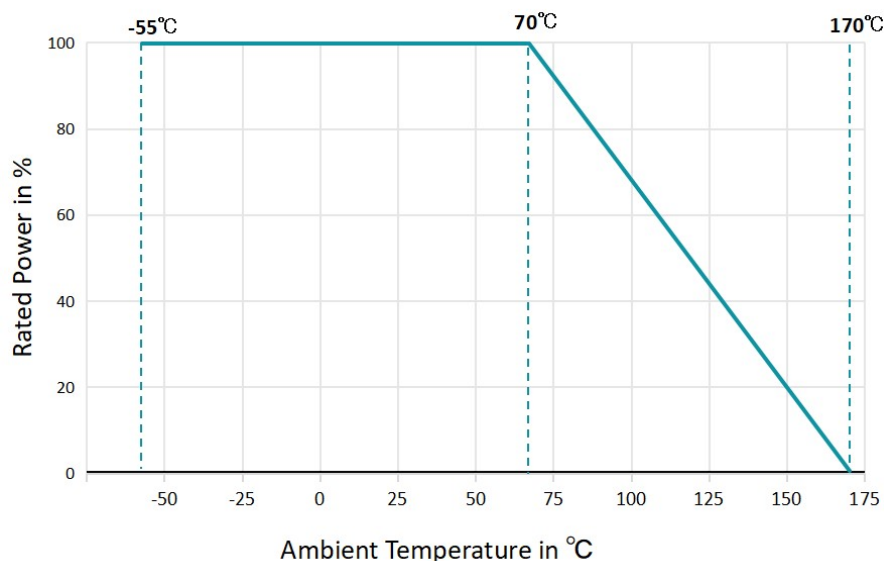
| Test Items<br>测试项目                            | Reference<br>依据标准                               | Conditions of Test<br>测试条件                                                                                        | Test Limits<br>测试结果       |
|-----------------------------------------------|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|---------------------------|
| Temperature Coefficient of Resistance<br>温度系数 | AEC-Q200 TEST 19<br>IEC 60115-1 4.8             | Measuring points -55°C and +125°C, reference point +20°C<br>测量点-55℃和+125℃, 参考点+20℃                                | 见图表                       |
| High Temperature Exposure (Storage)<br>高温存储   | AEC-Q200-REV D-Test 3<br>MIL-STD202 Method 108  | T=170°C, 1000hrs, Measurement at 24hrs after test conclusion.<br>170℃, 1000 小时, 测试结束后 24 小时测量。                    | $\Delta R \leq \pm 1\%$   |
| Temperature Cycling<br>温度循环                   | AEC-Q200-REV D-Test 4<br>JESD22 Method JA-104   | 1000 Cycle (-55°C to 125°C) Measurement at 24hrs after test conclusion.<br>1000 次循环 (-55℃至 125℃) 测试结束后 24 小时进行测量。 | $\Delta R \leq \pm 0.5\%$ |
| Short time overload<br>短时过载                   | IEC60115-1 4.13                                 | 5 X rated power for 5s<br>5 倍额定功率, 5 秒                                                                            | $\Delta R \leq \pm 0.5\%$ |
| Moisture Resistance<br>耐湿性                    | AEC-Q200-REV D-Test 6<br>MIL-STD-202 Method 106 | T=24 hours / Cycle, 10 Cycles. Notes: Steps 7a & 7b not required.<br>施加 T=24 小时/周期, 零功率, 方法中 7a 和 7b 不做要求         | $\Delta R \leq \pm 1\%$   |
| Biased Humidity                               | AEC-Q200-REV D-Test 7                           | 10% Rated power at 85°C, RH:85%, 1000Hrs, Measurement at 24hrs                                                    | $\Delta R \leq \pm 0.5\%$ |

FCM-Series  
Pure Alloy High Power Chip Resistor  
FCM 系列纯合金高功率贴片电阻



|                                      |                                                  |                                                                                                                                                          |                                  |
|--------------------------------------|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| 高温高湿                                 | MIL-STD-202 Method 103                           | after test conclusion.<br>10%额定功率, 85℃, 相对湿度: 85%, 1000 小时, 测试结束后 24 小时测量。                                                                               |                                  |
| Load Life<br>负载寿命                    | AEC-Q200-REV D-Test 8<br>MIL-STD-202 Method 108  | 1000 h at +70 °C, 1.5 h "ON", 0.5 h "OFF", Measurement at 24hrs after test conclusion.<br>1000 小时, +70 °C, 1.5 小时"开启", 0.5 小时"关闭", 测试结束后 24 小时测量。        | $\Delta R \leq \pm 1\%$          |
| Resistance to Soldering Heat<br>耐焊接热 | AEC-Q200-REV D-Test 15<br>MIL-STD-202 Method 210 | T=260±5℃ solder, 10±1 sec dwell<br>260±5℃焊接, 停留 10±1 秒。                                                                                                  | $\Delta R \leq \pm 0.5\%$        |
| Mechanical Shock<br>机械冲击             | AEC-Q200-REV D-Test 13<br>MIL-STD-202 Method 213 | 100g's, Normal duration is 6ms, half sine shock pulse<br>正半弦波,峰值加速度 100g's,脉冲持续 6ms,三轴六向各 3 次。                                                           | $\Delta R \leq \pm 0.5\%$        |
| Resistance to vibration<br>抗震性       | AEC-Q200-REV D-Test 14<br>MIL-STD-202 Method 204 | 5g's for 20min. 12cycles, 10-2000Hz<br>10-2000Hz, 5g's, 20 分钟一个循环, X.Y.Z 三个方向各 12 个循环                                                                    | $\Delta R \leq \pm 0.5\%$        |
| Board Flex<br>板弯曲试验                  | AEC-Q200-REV D-Test 21<br>AEC-Q200-005           | Min 2mm deflection ,60sec.<br>2mm, 保持时间 60s                                                                                                              | $\Delta R \leq \pm 0.5\%$        |
| Thermal Shock<br>冷热冲击                | AEC-Q200-REV D-Test 16<br>MIL-STD-202 Method 107 | -55℃/+155℃. Note: Number of cycles required-1000, Maximum transfer time-20 seconds, Dwell time-15 minutes.<br>-55℃, 15 分钟~常温<20 秒~+155℃, 15 分钟, 1000 个循环 | $\Delta R \leq \pm 1\%$          |
| Solderability<br>可焊性                 | AEC-Q200-REV D-Test 18<br>J-STD-002              | Dip the terminal in a flux and then dip into a soldering bath at 245±5℃ for 3±0.5sec<br>沾助焊剂后浸入锡炉, 锡炉温度 245±5℃, 时间 3±0.5 秒。                              | > 95% area covered<br>> 95% 面积上锡 |

■ 功率衰减曲线 ( Derating Curve)



■ 包装规格 (Tapping Specification)

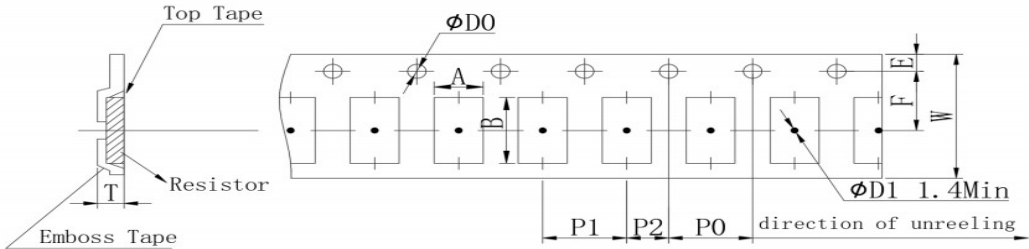
-卷盘尺寸 (Reel dimension)

| Type | Size |         | Unit | $\phi A$    | $\phi B$     | $\phi C$     | F            | W            |
|------|------|---------|------|-------------|--------------|--------------|--------------|--------------|
| 2512 | 7"   | 4K/Reel | mm   | $178\pm2.0$ | $60.0\pm1.0$ | $13.5\pm1.0$ | $15.4\pm2.0$ | $12.5\pm0.2$ |
| 3920 | 13"  | 2K/Reel | mm   | $330\pm2.0$ | $100\pm1.0$  | $13.5\pm1.0$ | $29\pm2.0$   | $24.5\pm0.2$ |
| 5930 | 13"  | 2K/Reel | mm   | $330\pm2.0$ | $100\pm1.0$  | $13.5\pm1.0$ | $29\pm2.0$   | $24.5\pm0.2$ |



-包装尺寸 (packing dimension)

Unit: mm

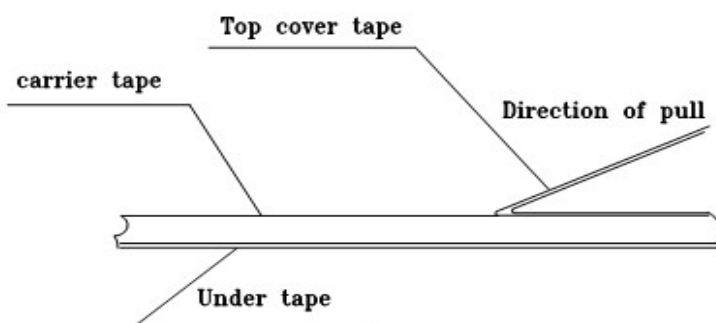


| Size | $A\pm0.2$ | $B\pm0.2$ | $W\pm0.2$ | $E\pm0.1$ | $F\pm0.1$ | $P0\pm0.1$ | $P1\pm0.1$ | $P2\pm0.1$ | $\phi D0$ | T   |
|------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|-----------|-----|
| 2512 | 3.5       | 6.8       | 16        | 1.75      | 7.5       | 4.0        | 8.0        | 2.0        | 1.5       | 1.8 |
| 3920 | 5.8       | 10.5      | 24        | 1.75      | 11.5      | 4.0        | 12         | 2.0        | 1.5       | 2.5 |
| 5930 | 8.6       | 16.1      | 24        | 1.75      | 11.5      | 4.0        | 12         | 4.0        | 1.5       | 2.5 |

## ■ 上胶带剥离力测试 (Peel force of top cover tape)

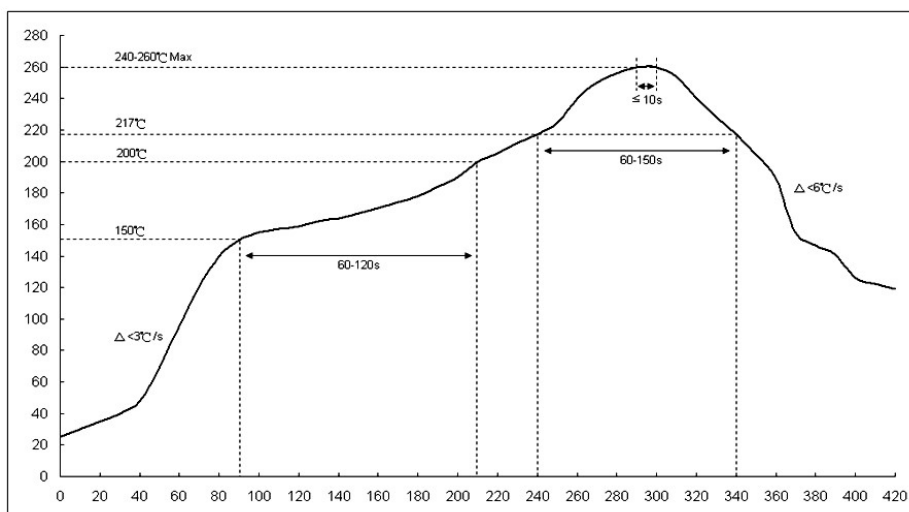
上胶带以 300mm/分钟的速度，沿 165~180 度角的方向进行剥离，如下图所示，剥离力范围为 10g~70g;

The top cover tape is pulled at a speed of 300 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 carrier tape shall be 0.1N to 0.7N(10 to 70 g),

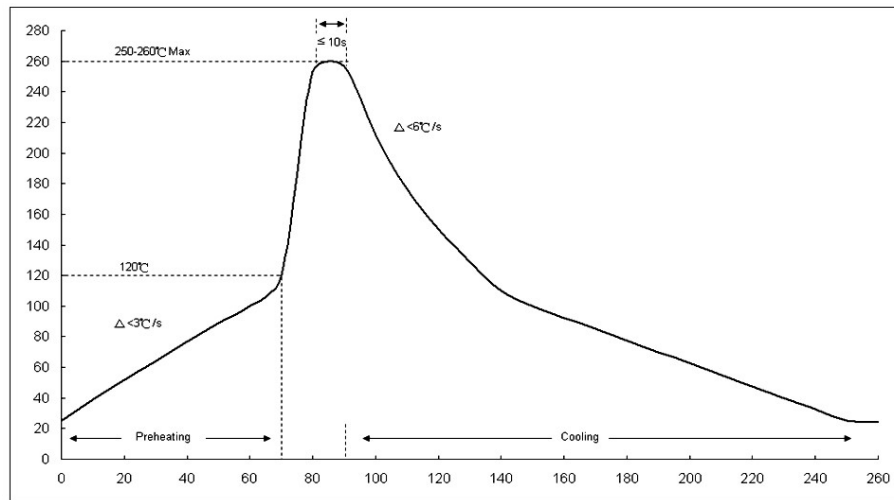


## ■ 焊接 (soldering)

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



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



**-手工焊温度 ( hand soldering temperature )**

烙铁温度  $350 \pm 10^{\circ}\text{C}$  3 秒之内，避免烙铁接触电阻本体

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

**■ 电阻器使用说明 (Chip Resistor Instructions for use)**

- 本产品在以下特殊环境下应用，性能可能会收到影响 (Application of the products in a special environment can deteriorate product performance) :

1. 高温;  
High temperature
2. 有海风或腐蚀性气体，包括氯气，硫化氢，氨气，二氧化硫，二氧化氮等;  
Near the sea ,or corrosive gas, such as  $\text{Cl}_2, \text{H}_2\text{S}, \text{NH}_3, \text{SO}_2$ , and  $\text{NO}_2$ , etc;
3. 各种类型的液体，包括水，油，化学品，有机溶剂的使用;  
Unverified liquids, such as water, oil, chemical or organic solvent;
4. 在用树脂或其他涂层材料密封产品的情况下使用;  
Unverified resin or paint to cover products;
5. 焊接后使用不洁焊剂或使用水或水溶性清洁剂清洗产品  
Products should be washed with soluble cleaner even if non cleaning flux.



- 储存 / 搬运条件 (STORAGE / CARRY CONDITIONS)

6. 储存温度  $25\pm5^{\circ}\text{C}$                       Temperature:  $25\pm5^{\circ}\text{C}$
7. 湿度 30~70%RH                      Humidity: 30~70%RH
8. 储存期限: 先进先出, 2 年              Storage life: 2years FIFO
9. 存放和搬运时, 请保持盒子的正确方向。严禁跌落在箱体上, 否则可能损坏产品电极或本体      Please hold box correct orientation when storing and carrying. It is strictly prohibited to fall on the box. otherwise the product electrode or body may be damaged.