

■车规合金片式跨接电阻器

Metal Foil Jumper Chip Resistor Automotive Grade

◆特征 Features

- * 符合 AEC-Q200 汽车标准条款
Compliant with AEC standard
- * 电阻值: $<0.5\text{m}\Omega$
Resistance values: $<0.5\text{ mOhm}$
- * 规格型号从 0603 - 2512
Chip size from 0603 - 2512
- * 装配成本低, 并与自动贴装设备匹配。
Low assembly cost, suit for automatic SMT equipment.
- * 适于作电流探测用电阻器如电源电路等
Current detecting resistors for power supply etc
- * 符合 RoHS 指令要求
Compliant with RoHS directive



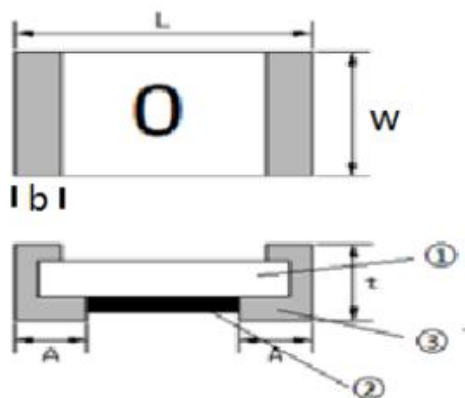
◆应用领域 Application

适用于复杂线路图设计跨接线路用。
It is suitable for complex circuit layout involving jumper circuit.

◆型号表示方法 Part Number

| | | | | | | | | |
|--|-----------------------------|----------------------|-------------------|--------------------------------|---------------------------------------|------------------------------|------------|-----------------------|
| AMF | F | 05 | 0000 | B | T | | | |
| ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | | |
| 产品代号 Product Code | 额定功率代号 Power Rating Code | | 型号代号 Type Code | 电阻值代号 Resistance Value Code | 阻值误差精度代号 Resistance Tolerance Code | 包装方式代号 Packing Style Code | | |
| 车规合金片式 跨接电阻器 Metal Foil Jumper Chip Resistor Automotive Grade | 代号 Code | 功率系列 Power rating | 代号 Code | 型号 Type | 代号 Code | 误差精度 Tolerance | 代号 Code | 包装方法 Packing Style |
| | F | 1/4W | 03 | 0603 | 0000=0Ω | B | T | 编带包装 Tape & Reel |
| | G | 1/2W | 05 | 0805 | | | | |
| | H | 3/4W | 06 | 1206 | | | | |
| | L | 2W | 12 | 2512 | | | | |
| | | | | | <0.5mΩ | | | |

◆产品结构 Construction

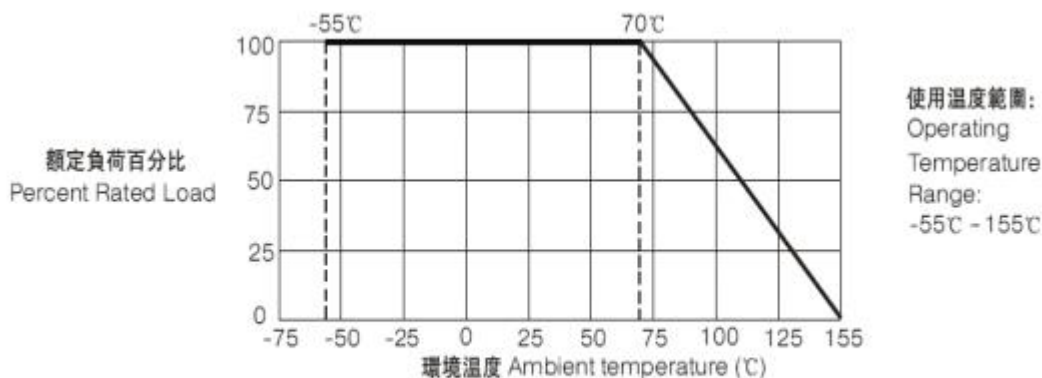


| 序号 | 结 构 Construction |
|----|-------------------------|
| ① | 陶瓷基板 Ceramic Substrate |
| ② | 合金电阻层 Alloy Plate |
| ③ | 铜/镍/锡层 Cu/Ni/Sn Plating |

◆规格尺寸 Dimensions

| 型号 Type | L (mm) | W (mm) | T (mm) | A (mm) | b (mm) |
|------------|-----------|-----------|-----------|-----------|-----------|
| 0603 | 1.60±0.20 | 0.80±0.20 | 0.70±0.15 | 0.60±0.20 | ≤0.55 |
| 0805 | 2.00±0.20 | 1.25±0.20 | 0.72±0.15 | 0.70±0.20 | ≤0.65 |
| 1206 | 3.20±0.20 | 1.60±0.20 | 0.75±0.15 | 1.30±0.20 | ≤0.80 |
| 2512 | 6.40±0.20 | 3.20±0.20 | 0.75±0.20 | 2.50±0.25 | ≤1.00 |

◆负荷下降曲线 Derating Curve



注：當電阻使用的環境溫度超過70℃時，其額定負荷(額定功率)按上述曲線下降。

Note: For resistors operated in ambient over 70℃, rated load (rated power) shall be derated in accordance with the above figure.

◆额定值 Ratings

| 型号Type | 70℃下额定功率 Rating Power at 70℃ (W) | 额定工作电流 Limiting Element Current (A) | 最大阻值 Max Resistance (mΩ) | 工作温度范围 Operating Temperature Range | 最大过载电流 Max. Over load Current (A) |
|--------|--|---|--------------------------------|--|---|
| 0603 | 1/4 | 22.4 | 0.5 | -55℃~+155℃ | 50 |
| 0805 | 1/4 | 22.4 | | | 50 |
| 1206 | 3/4 | 38.7 | | | 86.6 |
| 2512 | 2 | 63.2 | | | 126.5 |

◆可靠性测试方法 Reliability Test Method

| 项目 Item | 标准 Specifications | 测试方法 Test Methods |
|--|--|--|
| 工作寿命 Operational Life | 无可见损伤 No mechanical damage $R < 0.5m\Omega$ | AEC-Q200 Test 8/ MIL-STD-202 Method 108 70℃±2℃, 1000 小时, 额定电流或元件极限电流 (取较小值), 通 1.5 小时/ 断 0.5 小时。 70℃±2℃, 1000h, rated current or limiting element current whichever is lower for 1.5h ON/0.5h OFF. |
| 高温存储 High Temperature Exposure (Storage) | 无可见损伤 No mechanical damage $R < 0.5m\Omega$ | AEC-Q200 Test 3 / MIL-STD-202 Method 108 1000 小时 @ T=155℃±2℃, 不通电。 1000 h. @ T=155℃±2℃. Unpowered. |
| 热冲击 Thermal Shock | 无可见损伤 No mechanical damage $R < 0.5m\Omega$ | AEC-Q200 Test 16/ MIL-STD-202 Method 107 -55℃(15 分钟)~常温(≤20 秒)~155℃(15 分钟), 300 个循环。 -55℃(15min)~normal temperature(≤20s)~155℃(15min) , 300 cycles. |
| 短时间过负载 Short Time Overload | 无可见损伤 No mechanical damage $R < 0.5m\Omega$ | IEC 60115-1 8.1 1/4W、1/3W、1/2W、1W: 5 倍额定功率, 保持 5 秒。 2W: 4 倍额定功率, 保持 5 秒。 1/4W、1/3W、1/2W、1W: 5×Rated Power, for 5 s 2W: 4×Rated Power, for 5 s |
| 基板弯曲试验 Substrate Bending Test | 无可见损伤 No mechanical damage $R < 0.5m\Omega$ | AEC-Q200 Test 21/ AEC-Q200-005 弯曲距离(Bending distance): 2mm。 保持时间(Duration): 60s±5s. |
| 可焊性 Solderability | 无可见损伤 No mechanical damage 可焊面积≥95% 95% Cover Min | AEC-Q200 Test 18/ IEC 60115-1 11.1 245℃±5℃锡槽, 保持 3s±0.3s。 Lead-free solder bath at 245℃±5℃ for 3s±0.3s. |
| 耐焊接热 Resistance to Soldering Heat | 无可见损伤 No mechanical damage $R < 0.5m\Omega$ | AEC-Q200 Test 15/ MIL-STD-202 Method 210 270℃±5℃锡槽, 保持 10s±1s。 Lead-free solder bath at 270℃±5℃ for 10s±1s. |

◆ 包装 Packaging

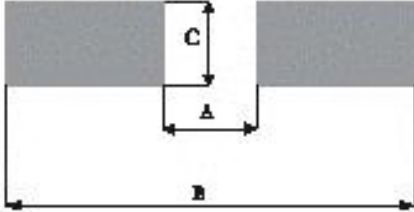
包装方式见附录 Packaging refer to the appendix.

附录 Appendix I

■ 推荐焊盘尺寸 Recommend Solder Pad Size

● 片式固定电阻器 Chip fixed resistor

单位 unit: mm



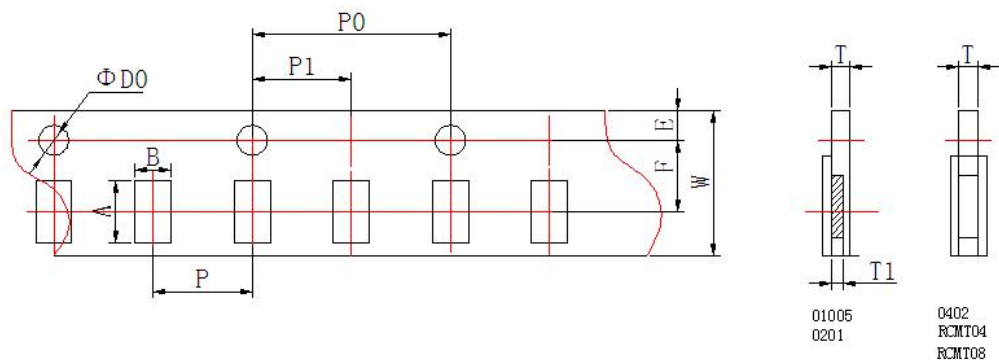
| 产品系列 | 型号 Type | 阻值范围 (mΩ) | A | B | C |
|---|---------|-----------|------|------|-----|
| 合金电阻及 车规合金电阻 Metal Foil Resistor | 0402 | 10 、 20 | 0.35 | 1.45 | 0.6 |
| | 0603 | 0 | 0.3 | 2.8 | 1.0 |
| | | 5 ~ 30 | 0.6 | | |
| | 0805 | 0 | 0.4 | 3.2 | 1.4 |
| | | 3 ~ 4 | 0.5 | | |
| | | 5 ~ 50 | 0.8 | | |
| | 1206 | 0 | 0.4 | 4.4 | 1.8 |
| | | 3 ~ 4 | 0.8 | | |
| | | 5 ~ 68 | 1.8 | | |
| | 2010 | 2 | 1.0 | 6.3 | 2.9 |
| | | 3 ~ 9 | 1.6 | | |
| | | 10 ~ 100 | 2.7 | | |
| | 2512 | 0 | 1.0 | 8.0 | 3.4 |
| | | 2 ~ 4 | 1.0 | | |
| | | 5 ~ 200 | 3.8 | | |

■ 包装 Packaging

* 纸带编带 Paper Taping

适用于 01005、0201、0402 、2R01、4R01、2R02、4R02:

For 01005、0201、0402 、2R01、4R01、2R02、4R02:



单位 unit: mm

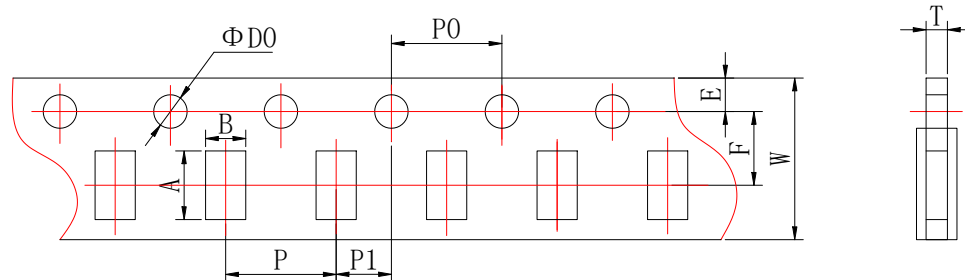
| 型号 Type | A | B | W | F | E |
|---------|-----------|-----------|-----------|-----------|-----------|
| 0402 | 1.20±0.10 | 0.70±0.10 | 8.00±0.20 | 3.50±0.05 | 1.75±0.10 |

单位 unit: mm

| 型号 Type | P | P0 | P1 | ΦD0 | T1 | T |
|---------|-----------|-----------|-----------|-----------|----|-----------|
| 0402 | 2.00±0.05 | 4.00±0.10 | 2.00±0.05 | 1.50±0.10 | / | 0.50±0.10 |

* 适用于 0603、0805、1206：

For 0603、0805、1206：



单位 unit: mm

| 型号 Type | A | B | W | F | E |
|---------|-----------|-----------|-----------|-----------|-----------|
| 0603 | 1.85±0.10 | 1.10±0.10 | 8.00±0.20 | 3.50±0.05 | 1.75±0.10 |
| 0805 | 2.35±0.10 | 1.65±0.10 | 8.00±0.20 | 3.50±0.05 | 1.75±0.10 |
| 1206 | 3.50±0.20 | 1.90±0.20 | 8.00±0.20 | 3.50±0.05 | 1.75±0.10 |

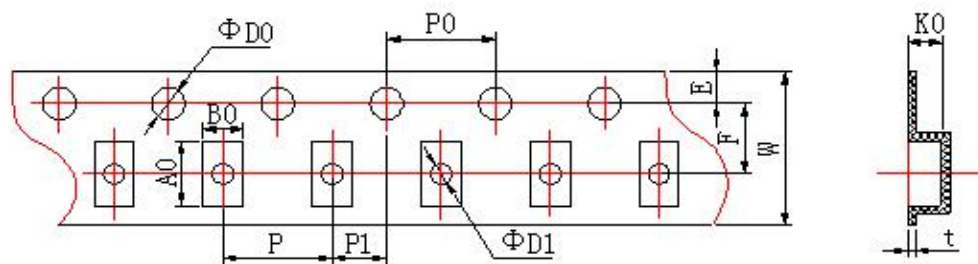
单位 unit: mm

| 型号 Type | P | P0 | P1 | ΦD0 | T |
|---------|-----------|-----------|-----------|-----------|---------------------------------|
| | | | | | 合金片式固定电阻 Metal Foil resistor |
| 0603 | 4.00±0.10 | 4.00±0.10 | 2.00±0.05 | 1.50±0.10 | 0.75±0.10 |
| 0805 | 4.00±0.10 | 4.00±0.10 | 2.00±0.05 | 1.50±0.10 | 0.95±0.10 |
| 1206 | 4.00±0.10 | 4.00±0.10 | 2.00±0.05 | 1.50±0.10 | 0.95±0.10 |

* 塑料带编带 Embossed Taping

适用于 2010、2512：

For 2010、2512：



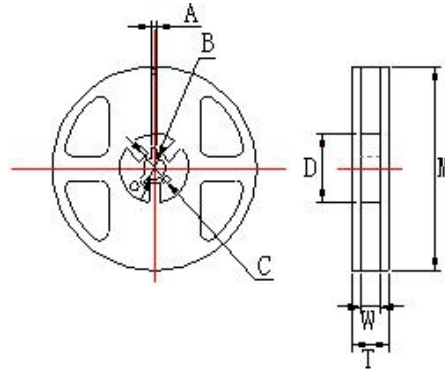
单位 unit: mm

| 型号 Type | A0 | B0 | W | F | E | t |
|---------|-----------|-----------|------------|-----------|-----------|-----------|
| 2010 | 5.50±0.15 | 2.82±0.15 | 12.00±0.10 | 5.50±0.10 | 1.75±0.10 | 0.25±0.05 |
| 2512 | 6.78±0.15 | 3.45±0.15 | 12.00±0.10 | 5.50±0.10 | 1.75±0.10 | 0.25±0.05 |

单位 unit: mm

| 型号 Type | P | P0 | P1 | ΦD0 | ΦD1 | K0 |
|---------|-----------|-----------|-----------|--------------|-----------|---------------------------------|
| | | | | | | 合金片式固定电阻 Metal Foil resistor |
| 2010 | 4.00±0.10 | 4.00±0.10 | 2.00±0.05 | 1.50+0.10/-0 | 1.50±0.10 | 0.84±0.10 |
| 2512 | 4.00±0.10 | 4.00±0.10 | 2.00±0.05 | 1.50+0.10/-0 | 1.50±0.10 | 1.00±0.10 |

* 卷盘 Reel



单位 unit: mm

| 卷盘尺寸 Reel Type | 型号 Type | M | W | T | A | B | C | D |
|---------------------------|------------------------|---------|----------|----------|---------|----------|----------|----------|
| 7 英寸 7inch dia.Reel | 0402、0603 0805、1206 | 178±2.0 | 9.5±1.0 | 12.5±1.5 | 2.0±0.5 | 13.0±0.5 | 21.0±0.5 | 58.0±2.0 |
| | 2010、2512 | 178±2.0 | 13.0±0.5 | 15.5±1.5 | 2.0±0.5 | 13.0±0.5 | 21.0±0.5 | 57.0±2.0 |

●编带包装能力 Taping Ability

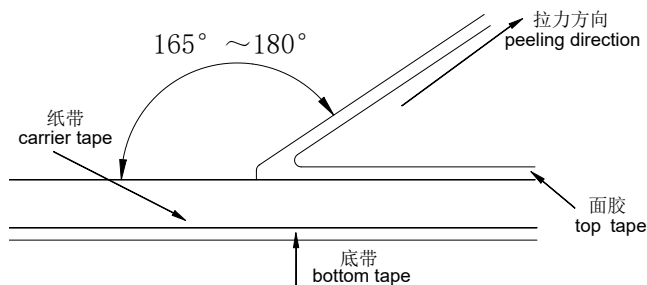
面带拉力 Top tape peel strength

面带拉力强度未 11g ~70g (0.1N~0.7N) , 速度: 300mm/min, 经下列试验后不允许有破裂断带现象。

Peel strength is 11g ~70g (0.1N~0.7N),with speed of 300mm/min,and should not have flash and

tear after peeling.

测试方法 Test method:



电阻松动自如, 无粘面胶带、底胶带现象。

Resistor is free, no sticking to top tape and bottom tape.

电阻易从纸带中取出, 且晶片孔无机械损伤。

Resistor is easy to take out from carrier tape and chip hole have no mechanical damage.

● 包装数量 Packaging Quantity

| 包装方法 Packaging style | 7 英寸 7inch dia.Reel | | |
|-------------------------|------------------------|----------------|-----------|
| 型号 Type | 0402 | 0603、0805、1206 | 2010、2512 |
| 数量 Quantity (pcs) | 10000 | 5000 | 4000 |

■ 电流检测电阻阻值代码及标记规则

Description for resistance Value Code and Marking of Current Sensing Thick Film Chip Resistor

● 阻值代码 Resistance Value Code

所有电流检测电阻全尺寸统一采用四位数组值代码表示。

All resistance value code of current sensing thick film chip resistor used four digits.

例 Example

MFF03KR010FT

四位数组值代码表示，如：R010=10mΩ；7M50=7.5mΩ

To use four digits codes represent resistance value,

例 Example R010=10mΩ；7M50=7.5mΩ

● 标记 Marking

*0805、1206、1210、2010、2512 系列（≤±5%）：采用四位标记代码。

For (0805、1206、1210、2010、2512, ≤±5%), we suggest preferentially use four digits.

| 标记代码 Mark Code | 阻值范围 Resistance Value | 示例 Sample |
|-------------------|---|--------------|
| R00× | 1mΩ ≤ R ≤ 9mΩ | R005=5mΩ |
| R0× | 10mΩ ≤ R ≤ 99mΩ | R033=33mΩ |
| R× | 100mΩ ≤ R ≤ 999mΩ | R100=100mΩ |
| × | 1mΩ < R < 10mΩ (包含小数点后两位有效数字) (Contains two significant digits after the decimal point.) | 5M10=5.1mΩ |
| × | 10mΩ < R < 100mΩ (包含小数点后一位数字) (Contains one significant digit after the decimal point.) | 30M1=30.1mΩ |

* 0603 系列（≤±5%）：采用两位标记代码。

For the chip resistor (0603, ≤±5%), we suggest preferentially use two digits.

| 标记代码 Mark Code | 阻值范围 Resistance Value | 示例 Sample |
|-------------------|--------------------------|--------------|
| 0× | 1mΩ ≤ R ≤ 9mΩ | 05=5mΩ |
| × | 10mΩ ≤ R ≤ 99mΩ | 33=33mΩ |

*≤0402 产品不印刷标记。

For the chip resistor (≤0402), there is no mark on the glass side.

* 客户对标记有特殊要求时，则按照协商的结果印刷标记。

To get agreement by both party if there special requirement for the marking.

■ 片式电阻器使用说明 Chip Resistor Instructions For Use

● 本产品以下特殊环境下应用，性能可能会受到影响：

- 1、在各种类型的液体，包括水、油、化学品、有机溶剂的使用。
- 2、在户外直接暴露在阳光的地方，或在灰尘多的地方使用。
- 3、在产品暴露的地方，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。
- 4、在产品暴露于静电或电磁波的地方使用。
- 5、在产生热量的部件、塑料线，或其他易燃物品附近使用。
- 6、在用树脂或其他涂层材料密封产品的情况下使用。
- 7、焊接后使用不洁焊料或使用水或水溶性清洗剂清洗产品。
- 8、片状电阻器的基材是氧化铝。由于和安装基板的热膨胀系数不同，在反复施加提供热循环等热应力时，接合部的焊锡（焊锡部）有时会发生裂纹。如果环境温度反复发生很大的变动，并且载荷反复进行 ON/OFF，则需要注意龟裂的发生。因热应力而发生的龟裂，取决于所安装的焊盘的大小、焊锡量、安装基板的散热性等，因此在环境温度有很大的变化或者载荷 NO/OFF 的条件下使用时，请充分注意以进行设计。

● Application of the products in a special environment can deteriorate product performance:

- 1、Use in various types of liquid, including water, oils, chemicals, and organic solvents.
- 2、Use outdoors where the products are exposed to direct sunlight, or in dusty places.
- 3、Use in places where the products are exposed to sea winds or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, and NO₂ etc.
- 4、Use in places where the products are exposed to static electricity or electromagnetic waves.
- 5、Use in proximity to heat-producing components, plastic cords, or other flammable items.
- 6、Use involving sealing or coating the products with resin or other coating materials.
- 7、Use involving unclean solder or use of water or water-soluble cleaning agents for cleaning after soldering.
- 8、The substrate of chip resistors is alumina. Cracks may occur at the connection of solder (solder fillet portion) due to the difference of the coefficient of thermal expansion from a mounting board when heat stresses like heat cycle, etc. are repeatedly given to them. Care should be taken to the occurrence of the cracks when the change in ambient temperature or ON/OFF of load is repeated. The occurrence of the crack by heat stress may be influenced by the size of a pad, solder volume, heat radiation of mounting board etc., so please pay careful attention to designing when a big change in ambient temperature and conditions for use like ON/OFF of load can be assumed.

● 产品使用注意事项

- 1、避免采用超过正常额定功率的功率，超过额定功率的稳态负载条件下可能会对产品性能和可靠性产生负面影响。
- 2、用镊子拿起产品时要小心，有可能会将保护或电阻体夹碎。
- 3、手动安装产品时，烙铁头勿触碰产品。
- 4、贮存条件：温度 5℃~30℃，相对湿度 30%RH~70%RH。

建议在符合上述储存条件下十二个月内使用。

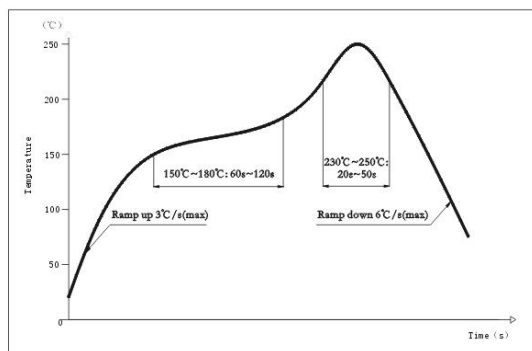
- 5、用于车载设备、医疗设备、航空设备以及其他涉及人身安全、或可能引起重大损失的设备上时，请务必事先与我公司联系。这些产品在这类用途中出现故障或失灵可能导致人身事故或严重损坏。

● Precautions on use of products

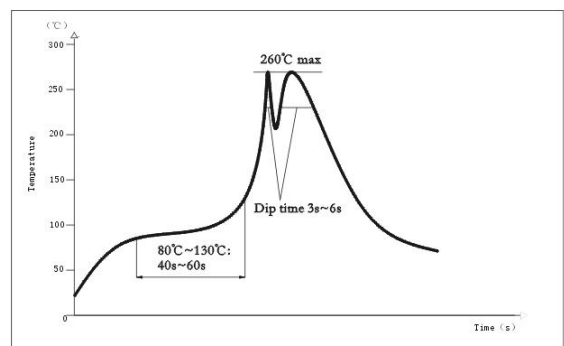
- 1、 Avoid applying power exceeding normal rated power, exceeding the power rating under steady-state loading condition may negatively affect product performance and reliability.
- 2、 Be careful when pick up the products with tweezers. There may be a care that the overcoat and / or the body can be chipped.
- 3、 Soldering tip shall not touch the product when install product manually.
- 4、 Storage conditions: T: 5℃~30℃, RH: 30%RH~70%RH. The products are suggested to be used within twelve months when received, and the storage condition mentioned above should be followed.
- 5、 Contact our sales representatives before you use our products for applications including automotive, medical equipment and aerospace equipment. Malfunction or failure of the products in such applications may cause loss of human life or serious damage.

■ 焊接 Soldering

● 推荐的回流焊曲线 Recommended reflow profile



● 推荐的波峰焊曲线 Recommended wave solder profile



● 推荐的焊膏类型 Recommended solder alloy: 96.5Sn-3.0Ag-0.5Cu

◆修订履历 Revision History

| 版本 Version | 日期 Date | 修订内容 Change Description | 修订确认 Checked by |
|---------------|------------|---------------------------|------------------|
| I 0 | 2025-10-16 | -原版 The original version. | 冯伟键 Weijian Feng |

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