FOSAN TECHNOLOGY 富捷科技

# Product Datasheet
## 产品规格说明书

## FRR Series Automotive-grade Anti-Sulfur Thick Film Chip Resistor

## 车规抗硫化厚膜片式电阻器

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# 车规抗硫化厚膜片式电阻器
# Automotive-grade Anti-Sulfured Thick Film Chip Resistor FRR Series




## ■ 特点 (Features)

- 体积小，重量轻 - Miniature and light weight
- 电性能稳定，可靠度高 - Stable electrical capability and high Reliability
- 符合 RoHS 指令 - Compliant with RoHS directive
- 具有优越的抗硫化性能 - With excellent Anti-sulfured performance
- 符合汽车标准相关条款 -Compliant with AEC-Q200 standard

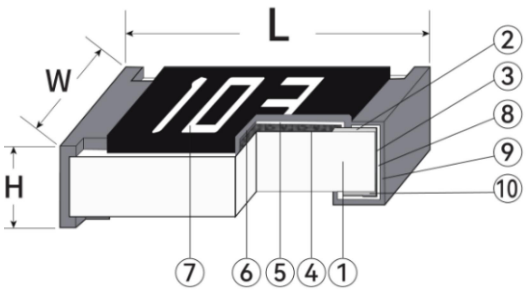
## ■ 应用 (Application)

- 发动机动力控制系统、底盘安全控制系统、车身电子控制系统、汽车信息系统、影音娱乐系统、车载导航系统等。
- Engine power control system, Chassis safety control system,Electronic body control system, Automotive information system, Audio-visual entertainment system,Vehicle navigation system, etc.

## ■ 产品料号 (Parts Number Explanation) 示例：FRR1206F1001TS

| F<br>公司名 | RR<br>产品别 | 1206<br>尺寸 | F<br>公差 | 1001<br>字码 | T<br>包装别 | S<br>端电极 | 特殊码 |
|---|---|---|---|---|---|---|---|
| FOJAN | **RR:**<br>**Automotive-grade**<br>**Anti-Sulfur**<br>Others series refer to Catalogue | 0201<br>0402<br>0603<br>0805<br>1206<br>1210<br>1812<br>2010<br>2512 | B:±0.1%<br>C:±0.25%<br>D:±0.5%<br>F:±1%<br>J:±5%<br>P: Jumper<br>H: 0～1%<br>L: -1～0% | ±5%:<br>3-digits+blank<br>102=1KΩ<br>1R0=1Ω<br>±1%&Below:<br>4-digits<br>1001=1KΩ<br>1R00=1Ω | T: 7 inch reel<br>Q:10 inch reel<br>R:13 inch reel<br>B:Bulk | S: Sn<br>C: Cu<br>A: Au | Blank:<br>none |
| Company | Type | Size | Tolerance | Resistance | Packaging | Termination | Special Case |

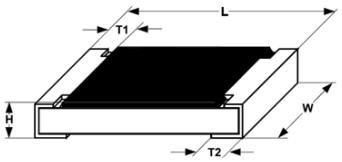
## ▪ 电阻结构（Construction）




| NO. | 结构 construction | 主要材料 Major material |
|---|---|---|
| 1 | 陶瓷基板 Ceramic substrate | 三氧化二铝 $Al_2O_3$ |
| 2 | 导电层 Conductive layer（Top） | 银/银钯 Ag/Ag-Pd |
| 3 | 侧导层 Side conductive layer | 镍铬合金 Ni-Cr |
| 4 | 阻体层 Resistive layer | 氧化钌 $RuO_2$ |
| 5 | 内保护层 Inner protective layer | 玻璃 Glass |
| 6 | 外保护层 Outer Protective layer | 环氧树脂 Epoxy |
| 7 | 文字 Marking | 环氧树脂 Epoxy |
| 8 | 镍电极 Ni plating layer | 镍 Ni |
| 9 | 锡电极 Sn plating layer | 锡 Sn |
| 10 | 导电层 Conductive layer（Back） | 银 Ag |

## ▪ 尺寸 (Dimension):

尺寸 Dimension




单位（unit）： mm

| 型别（Type） | | L | W | H | T1 | T2 |
|---|---|---|---|---|---|---|
| 英制 | 公制 | | | | | |
| **0201** | **0603** | 0.60±0.03 | 0.30±0.03 | 0.23±0.03 | 0.10±0.05 | 0.15±0.05 |
| **0402** | **1005** | 1.00±0.05 | 0.50±0.05 | 0.35±0.05 | 0.20±0.10 | 0.25±0.10 |
| **0603** | **1608** | 1.60±0.10 | 0.80±0.10 | 0.45±0.10 | 0.25±0.15 | 0.25±0.15 |
| **0805** | **2012** | 2.00±0.10 | 1.25±0.10 | 0.50±0.10 | 0.35±0.20 | 0.40±0.20 |
| **1206** | **3216** | 3.10±0.10 | 1.60±0.10 | 0.55±0.10 | 0.45±0.20 | 0.45±0.20 |
| **1210** | **3225** | 3.10±0.10 | 2.50±0.15 | 0.55±0.10 | 0.45±0.15 | 0.50±0.20 |
| **1812** | **4532** | 4.50±0.20 | 3.10±0.20 | 0.55±0.10 | 0.55±0.20 | 0.70±0.20 |
| **2010** | **5025** | 5.00±0.10 | 2.50±0.15 | 0.55±0.10 | 0.45±0.15 | 0.50±0.20 |
| **2512** | **6432** | 6.35±0.10 | 3.10±0.15 | 0.55±0.10 | 0.60±0.20 | 0.90±0.20 |

## ▪ 电气特性 (Electrical characteristics)

| 型别 Type | 70°C 下额定功率 Rated Power at 70°C | 最大工作电压 Max Working Voltage | 最大过负荷电压 Max Overload Voltage | 绝缘耐压 Dielectric Withstanding Voltage |
|---|---|---|---|---|
| **0201** | 1/20W | 25V | 50V | 50V |
| **0402** | 1/16W | 50V | 100V | 300V |
| **0603** | 1/10W | 75V | 150V | 300V |
| **0805** | 1/8W | 150V | 300V | 500V |
| **1206** | 1/4W | 200V | 400V | 500V |
| **1210** | 1/2W | 200V | 400V | 500V |
| **1812** | 3/4W | 200V | 500V | 500V |
| **2010** | 3/4W | 200V | 400V | 500V |
| **2512** | 1W | 200V | 400V | 500V |

| 型别 Type | 零欧姆阻值 Value of Jumper | | 零欧姆额定电流 Rated Current of Jumper | 零欧姆最大电流 Max Current of Jumper | 阻值范围 Resistance Range | | |
|---|---|---|---|---|---|---|---|
| | ±1% | ±5% | | | 1%以下 | 1%、2% | 5% |
| **0201** | | <50mΩ | 0.5A | 1A | - | 10Ω-10MΩ | 10Ω-10MΩ |
| **0402** | <30mΩ | <50mΩ | 1A | 2.5A | 1Ω-10MΩ | 0.1Ω-10MΩ | 0.1Ω-10MΩ |
| **0603** | <30mΩ | <50mΩ | 1A | 2.5A | 1Ω-10MΩ | 0.1Ω-10MΩ | 0.1Ω-10MΩ |
| **0805** | <30mΩ | <50mΩ | 2A | 5A | 1Ω-10MΩ | 0.1Ω-10MΩ | 0.1Ω-10MΩ |
| **1206** | <30mΩ | <50mΩ | 2A | 10A | 1Ω-10MΩ | 0.1Ω-10MΩ | 0.1Ω-10MΩ |
| **1210** | <30mΩ | <50mΩ | 2A | 10A | 1Ω-10MΩ | 0.1Ω-10MΩ | 0.1Ω-10MΩ |
| **1812** | <30mΩ | <50mΩ | 2A | 10A | 1Ω-10MΩ | 0.1Ω-10MΩ | 0.1Ω-10MΩ |
| **2010** | <30mΩ | <50mΩ | 2A | 10A | 1Ω-10MΩ | 0.1Ω-10MΩ | 0.1Ω-10MΩ |
| **2512** | <30mΩ | <50mΩ | 2A | 10A | 1Ω-10MΩ | 0.1Ω-10MΩ | 0.1Ω-10MΩ |

**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)

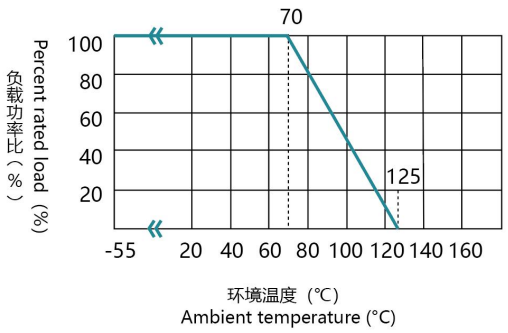
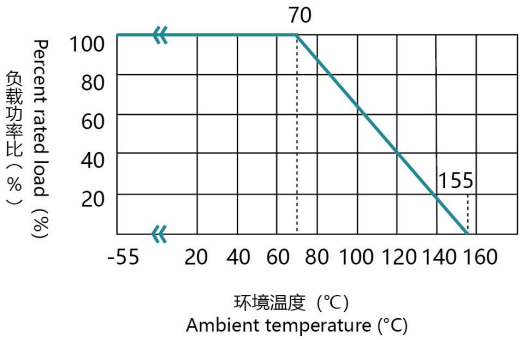
P：额定功率（Rated Power ） (W)

R：电阻阻值（Resistance ） (ohm)

若公式计算所得数值超出上表所列最大工作电压，则应以最大工作电压作为额定电压。

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

## ■ 功率衰减曲线（Derating Curve）

| 使用温度范围 Temperature | -55℃~+125℃(0201) | -55℃~+155℃（其他） |
|---|---|---|
| 说明 Describe | 周围温度若超过 70℃至 125℃之间，功率可照下图曲线予以修订<br>If the ambient temperature exceeds 70°C to 125°C, the power can be revised according to the curve in the following figure | 周围温度若超过 70℃至 155℃之间，功率可照下图曲线予以修订<br>If the ambient temperature exceeds 70°C to 155°C, the power can be revised according to the curve in the following figure |
| 功率衰减曲线图 Power Attenuation Curvee |  |  |

## ■ 温度系数（Temperature Coefficient）

| 型别 Type | 阻值范围 Resistance Range | 产品精度和温漂系数（ppm/°C） Resistance Tolerance and TCR（ppm/°C） | | |
|---|---|---|---|---|
| | | ±1%以下 | ±1%、±2% | ±5% |
| **0201** | 10Ω≤R < 10MΩ | ±200 | ±200 | ±200 |
| **0402/0603/0805 1206/1210 1812/2010/2512** | 0.1Ω≤R < 1Ω | ±800 | ±800 | ±800 |
| | 1Ω≤R < 10Ω | ±200 or ±400 | ±200 or ±400 | ±200 or ±400 |
| | 10Ω≤R < 10MΩ | ±100 | ±100 | ±100 |

## ▪ 性能（Performance）

| 内容<br>Item | 测试方法<br>Test Methods | 测试条件<br>Test Conditions | 规格<br>Specification |
|---|---|---|---|
| 温度系数<br>Temperature Coefficient | JIS C 5201 4.8<br>IEC60115-1-4.8 | TCR=（R-$R_0$）/（t-$t_0$）$R_0$ ×$10^6$(ppm)<br>R0：电阻在室温下的阻值（resistance at room temperature）<br>R: 电阻在 125℃或-55℃下的阻值（resistance at 125℃ or -55℃）<br>t0：室温（room temperature）<br>t.测试温度（test temperature 125℃ or -55℃） | As SEPC |
| 短时间过负荷<br>Short-time overload | JIS C 5201 4.13<br>IEC60115-1-4.13 | 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。<br>Applied 2.5 times of rated voltage for 5 second. Measure the variation of resistance. | ≤1%产品：±(1.0%+0.05Ω)<br>≥2%产品：±(2.0%+0.05Ω) |
| 高温储存<br>High Temperature Exposure (Storage) | AEC-Q200 TEST 3<br>MIL-STD-202<br>METHOD 108 | 125℃下放置 1000h，不加载功率，试验结束 24±4 小时后进行测 试。<br>1000 hrs. @ T=155 . Unpowered. Measurement at 24±4 hours ℃<br>after test conclusion | ±(1.00%+0.05Ω) |
| 温度循环<br>Temperature Cycling | AEC-Q200 TEST 4<br>JESD22<br>METHOD JA-104 | -55 ~+ 155，℃ ℃ 循环 1000 次，在每一个极限温度持续时间不超过 30 分钟，且温度转换时间不超过 1 分钟，试验结束 24±4 小时<br>后进行测试。<br>1000 Cycles (-55 to +155 ) Measurement at 24±4 hours ℃ ℃ after test conclusion. 30min maximum dwell time at each temperature extreme. 1min. maximum transition time. | ±(2.00%+0.05Ω) |
| 温湿循环<br>Moisture resistance | MIL-STD-202<br>METHOD 106 | 25°C~65°C,90%～100%RH, 2.5 小时； 65°C 90%～100%RH, 3 小时； 65°C~25°C,80%～100%RH,2.5 小时，10 个循环，试验结束 24±4 小时后进行测试。<br>25°C~65°C,90%～100%RH, 2.5H; 65°C 90%～100%RH, 3H; 65°C~25°C<br>80%～100%RH, 2.5H, 10 cycles, Measurement at 24±4 hours after test conclusion. | ≤1%产品：±(1.0%+0.05Ω)<br>≥2%产品：±(2.0%+0.05Ω) |
| 耐湿特性<br>Humidity | MIL-STD-202<br>METHOD 103<br>AEC-Q200 TEST 7 | 电阻放入恒温恒湿箱，加载 10%额定功率，85℃ /85%RH，持续通电 $1000^{+24}/_{-0}$H，试验结束 24±4 小时后进行测试<br>Put the specimen in a chamber Load 10% of operating power,1000 hours 85℃/85%RH. Measurement at 24±4 hours after test conclusion. | ≤1%产品：±(1.0%+0.05Ω)<br>≥2%产品：±(2.0%+0.05Ω) |

| 内容<br>Item | 测试方法<br>Test Methods | 测试条件<br>Test Conditions | 规格<br>Specification |
|---|---|---|---|
| 负荷寿命<br>Load life | MIL-STD-202<br>METHOD 108<br>AEC-Q200 TEST 8 | 电阻放入恒温箱中，温度 125±2℃，加载 45%额定功率，ON TIME:1.5H，OFF TIME:0.5H，通电 1000 $^{+24}/_{-0}$H 试验结束，24±4 小时后进行测试<br>Put the specimen in a chamber at 125±2℃ temperature, load 45% operating power ON TIME:1.5H, OFF TIME:0.5H, and applied for 1000 $^{+24}/_{-0}$H. Measurement at 24±4 hours after test conclusion. | ≤1%产品：±(1.0%+0.05Ω)<br>≥2%产品：±(2.0%+0.05Ω) |
| 焊锡性<br>Solderability | AEC-Q200 TEST 18<br>J-STD-002 | 用于引脚型和表面贴装型元件，不需要电气测试。 放大倍数 50 倍。 测试条件：<br>表面贴装型：<br>a）方法 B，干热@155℃,4 小时，@235℃,3±0.5 秒<br>b）方法 B，蒸煮 8 小时， @235℃,3±0.5 秒<br>For pin and surface-mount components, no electrical testing required. Magnification 50 times.Test conditions:<br>Surface mount type:<br>a) Method B: dry heat @155℃,4 hours, @235℃,3±0.5 seconds<br>b) Method B: cook for 8 hours at @235℃,3±0.5 seconds | 上锡面积>95%<br>Soldered are>95% |
| 抗焊锡热<br>Resist to soldering heat | AEC-Q200 TEST 15<br>MIL-STD-202<br>METHOD 210 | 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。<br>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. | ±(1.00% +0.05Ω) |
| 绝缘电阻<br>Insulation resistance | JIS C 5201 4.6<br>IEC60115-1-4.6 | 电阻本体上加载绝缘耐压 60±5 秒，测量绝缘阻抗。<br>Applied the dielectric withstanding voltage on the center of body for 60±5seconds. Then measure insulation resistance. | >10GΩ |
| 绝缘耐压<br>Dielectric withstanding voltage | JIS C 5201 4.7<br>IEC60115-1-4.7 | 电阻本体上加载绝缘耐压 60±5 秒。<br>Applied the dielectric withstanding voltage on the center of body for60±5seconds. | 无击穿、飞弧可见机械性损伤<br>No evidence of flash over, mechanical damage arcing or insulation breakdown |
| 端子强度<br>Terminal Strength | AEC-Q200 TEST 11<br>MIL-STD 202<br>METHOD 211 | 0402 0.5kgf；0603:1.0kgf；其他规格：2.0kgf 施加推力，维持 60±1 秒<br>0402:0.5kgf, 0603:1.0kgf; Other:2.0kgf ;60±1 seconds; | 无破损<br>No Broken |
| ESD 试验<br>ESD test | AEC-Q200 TEST 17<br>AEC-Q200-002 | 加载规定静电电压 2 次/间隔 1 秒，<br>0402 规格：0.5KV, 0603 规格：1KV, 其他规格 2KV.<br>0402: 0.5KV, 0603: 1.0KV, Other:2KV, 2times/1s | ±(3.0%+0.05Ω) |

| 内容<br>Item | 测试方法<br>Test Methods | 测试条件<br>Test Conditions | 规格<br>Specification |
|---|---|---|---|
| 端子弯曲<br>Terminal bending | AEC-Q200 TEST 21<br>AEC-Q200-005 | 电阻焊接在测试板上进行弯折，弯折保持时间 20±1 秒，1206（含） 以下的尺寸弯曲 5+0.2/0 mm; 1206 以上的尺寸弯曲 2+0.2/0 mm; 量测试验前后阻值变化率<br>Specimen shall be mounted on test board, then bend the board and maintained for 20±1s. the distance of bending is 5+0.2/0 mm for resistors which size no larger than 1206 or 2+0.2/0 mm which size larger than 1206. Measure the variation of resistance. | ±(1.00% +0.05Ω) |
| 耐溶剂性<br>Resistance to Solvents | AEC-Q200 TEST 12<br>MIL-STD 202<br>METHOD 215 | 注意：添加水性洗涤化学品-OKEM Clean 或等效物。请勿使用违 禁溶剂<br>Note: Add Aqueous wash chemical - OKEM Clean or equivalent. Do not use banned solvents. | 标识无脱落、损伤<br>No Marking fall off and broken |
| 抗硫化实验<br>Sulfuration test | ASTM-B-809-95<br>Method 2 | 方法一: 温度 105℃, 湿热蒸硫粉试验 (加饱和硝酸钾) 1000hrs<br>Method 1: steam sulfur powder test (with saturated potassium nitrate) at 105℃ with humidity and heat (1000hrs) | ±(3.0% +0.05Ω) Max |

## ■ 本体标识 (Marking on the Resistor's Body)

**1.0201 及 0402 因本体太小，本体上无字码标识**
For 0201 and 0402 size, no marking on the body due to the small size of the resistor

**2.公差±5%的产品，以三字码标示，前两位表示阻值的有效数字，最后一位表示 10 的乘幂**
±5% tolerance product: the marking is 3 digits, the first 2 digits are significant figures of resistance value and the 3rd one denotes the power number of 10, (10X)

**3.±0.5%，±1%，±2%的产品，以四字码标示，前三 位表示阻值的有效数字，最后一位表示 10 的乘幂**
±0.5%, ±1%,±2% tolerance product: the marking is 4 digits, the first 3 digits are significant figures of resistance value and the 4th one denotes the power number of 10, (10X)

**4.0603 ±1% E96 系列的标准阻值，因电阻本体太小，采用三位代码标识。**
Standard E96 series values of 0603 ±1%: due to the small size of the resistor’ s body, use 3digits code to indicate the resistance value.

**5.所有型别，所有精度零欧姆产品，采用 1 位代码标识，即 0**
All type and tolerance of Jumper products used 1 digit code to indicate the value,I.e.0

| | |
|---|---|
| 472 | **472=47×10²=4.7KΩ** |
| 5R6 | **10Ω以下标示：5R6=5.6Ω**<br>**Below 10Ω: 5R6=5.6Ω** |
| 4992 | **4992=499×10²=49.9KΩ** |
| 6R81 | **100Ω以下标示**<br>**6R81=6.81Ω**<br>**Below 100Ω: 6R81=6.81Ω** |
| 0 | **0Ω=0** |

## ▪ 0603±1% E96 系列电阻值代码 Standard E96 Series Resistance Value Code for 0603 ±1% Marking

| 代码 Code | 阻值 Value | 代码 Code | 阻值 Value | 代码 Code | 阻值 Value | 代码 Code | 阻值 Value | 代码 Code | 阻值 Value | 代码 Code | 阻值 Value |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **01** | 100 | **17** | 147 | **33** | 215 | **49** | 316 | **65** | 464 | **81** | 681 |
| **02** | 102 | **18** | 150 | **34** | 221 | **50** | 324 | **66** | 475 | **82** | 698 |
| **03** | 105 | **19** | 154 | **35** | 226 | **51** | 332 | **67** | 487 | **83** | 715 |
| **04** | 107 | **20** | 158 | **36** | 232 | **52** | 340 | **68** | 499 | **84** | 732 |
| **05** | 110 | **21** | 162 | **37** | 237 | **53** | 348 | **69** | 511 | **85** | 750 |
| **06** | 113 | **22** | 165 | **38** | 243 | **54** | 357 | **70** | 523 | **86** | 768 |
| **07** | 115 | **23** | 169 | **39** | 249 | **55** | 365 | **71** | 536 | **87** | 787 |
| **08** | 118 | **24** | 174 | **40** | 255 | **56** | 374 | **72** | 549 | **88** | 806 |
| **09** | 121 | **25** | 178 | **41** | 261 | **57** | 383 | **73** | 562 | **89** | 825 |
| **10** | 124 | **26** | 182 | **42** | 267 | **58** | 392 | **74** | 576 | **90** | 845 |
| **11** | 127 | **27** | 187 | **43** | 274 | **59** | 402 | **75** | 590 | **91** | 866 |
| **12** | 130 | **28** | 191 | **44** | 280 | **60** | 412 | **76** | 604 | **92** | 887 |
| **13** | 133 | **29** | 196 | **45** | 287 | **61** | 422 | **77** | 619 | **93** | 909 |
| **14** | 137 | **30** | 200 | **46** | 294 | **62** | 432 | **78** | 634 | **94** | 931 |
| **15** | 140 | **31** | 205 | **47** | 301 | **63** | 442 | **79** | 649 | **95** | 953 |
| **16** | 143 | **32** | 210 | **48** | 309 | **64** | 453 | **80** | 665 | **96** | 976 |

## ▪0603±1%标记的倍增码 Multiplier Code for 0603 ±1% Marking

| 代码 Code | Y | X | A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|---|
| 指数 Multiplier | $10^{-2}$ | $10^{-1}$ | $10^{0}$ | $10^{1}$ | $10^{2}$ | $10^{3}$ | $10^{4}$ | $10^{5}$ |

**阻值标示如下（**So the resistance value are marked as the following examples）




10D=124×$10^{3}$=124KΩ




38Y=243×$10^{-2}$=2.43Ω

0603 ±1%的产品，在标准 E24 系列中，但不属于 E96 系列，标示与 5%的字码相同，但是在中间字码下加一条线（Standard E24 and not belong to E96 series values of 0603 ±1%, the marking is the same as 5% tolerance but marking as underline）




33̲1=33×$10^{1}$=330Ω




56̲0=56×$10^{0}$=56Ω

## ▪ mΩ 值字码标识（mΩ Marking）

0603 规格（1%&5%）（0603Type）：3 字码（3-digits）




R10=100mΩ

0805/1206/1210/2010/2512/1812 规格（1%&5%）：4 字码

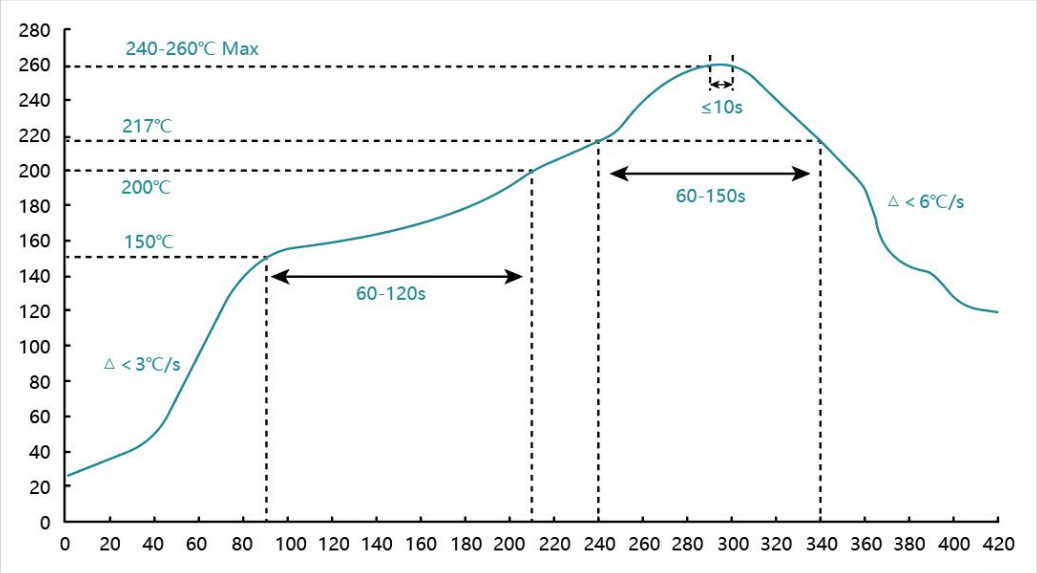
0805/1206/1210/2010/2512/1812type（1%&5%）：4-digits



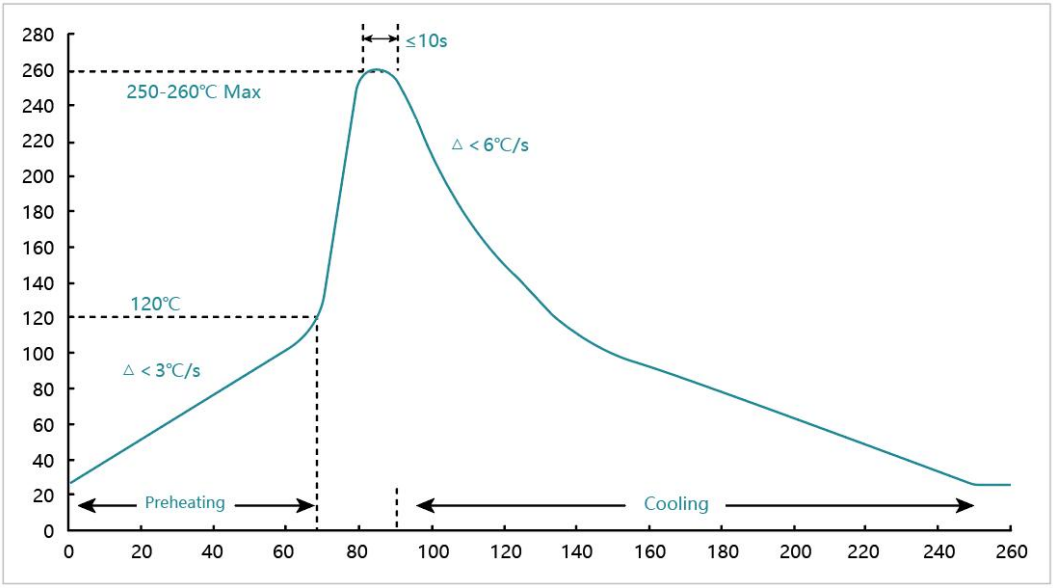

R100=100mΩ

## ■ 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)**



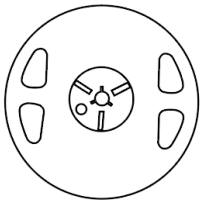

**- 手工焊温度（hand soldering temperature)**

烙铁温度 350±10℃ 3 秒之内，避免烙铁接触电阻本体

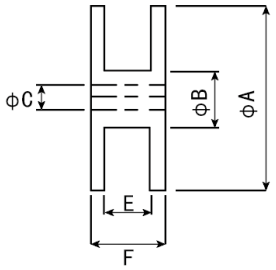
The iron temperature is 350±10℃, hand soldering time less than 3S. Avoid solder iron tip direct touch the components body

## ■ 包装规格 (Tapping Specification)

Reel



Standard Quantity per Reel
5000 pcs/Reel

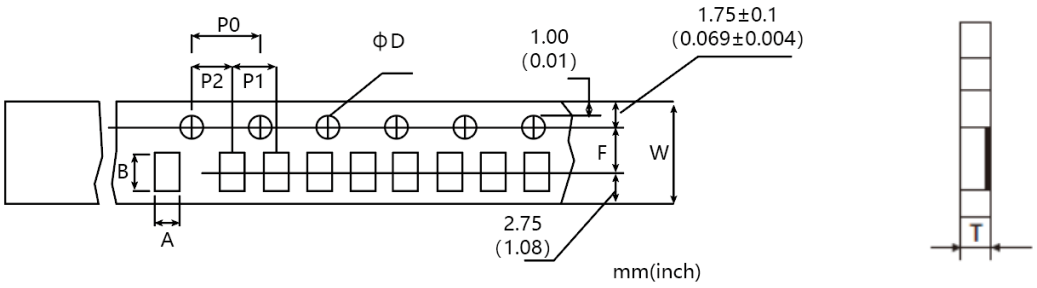



- 卷盘尺寸（Reel dimension）

| Type | Size | | Unit | A | B | C | F | E |
|---|---|---|---|---|---|---|---|---|
| 0201 | 7″ | 10K/15K Reel | mm | 178±2.0 | 60.0±1.0 | 13.5±0.5 | 11.4±0.1 | 9.00±0.3 |
| 0402 | 7″ | 10K/Reel | mm | 178±2.0 | 60.0±1.0 | 13.5±0.5 | 11.4±0.1 | 9.00±0.3 |
| 0402 | 13″ | 40K/50K Reel | mm | 330±2.0 | 100.0±1.0 | 13.5±0.5 | 11.4±0.1 | 9.00±0.3 |
| 0603/0805/1206/1210 | 7″ | 5K/Reel | mm | 178±2.0 | 60.0±1.0 | 13.5±0.5 | 11.4±0.1 | 9.00±0.3 |
| 0603/0805/1206 | 10″ | 10K/Reel | mm | 254±2.0 | 100.0±1.0 | 13.5±0.5 | 11.4±0.1 | 9.00±0.3 |
| 0603/0805/1206 | 13″ | 20K/Reel | mm | 330±2.0 | 100.0±1.0 | 13.5±0.5 | 11.4±0.1 | 9.00±0.3 |
| 1812/2010/2512 | 7″ | 4K/Reel | mm | 178±2.0 | 60.0±1.0 | 13.5±0.5 | 15.4±1.0 | 13.0±0.3 |

- 包装尺寸（packing dimension）

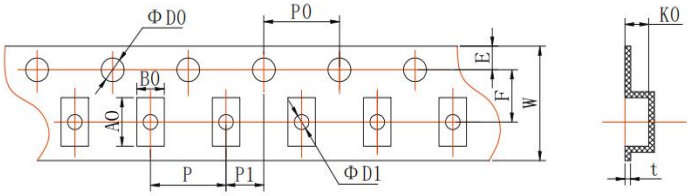
纸带编带 Paper Taping




**Unit: mm**

| Dim | A | B | D | F | P0 | P1 | P2 | W | T |
|---|---|---|---|---|---|---|---|---|---|
| 0201 | 0.38±0.05 | 0.68±0.05 | 1.50±0.10 | 3.50±0.05 | 4.00±0.10 | 2.00±0.10 | 2.00±0.05 | 8.00±0.20 | 0.42±0.03 |
| 0402 | 0.65±0.10 | 1.15±0.10 | 1.50±0.10 | 3.50±0.05 | 4.00±0.10 | 2.00±0.10 | 2.00±0.05 | 8.00±0.20 | 0.42±0.03 |
| 0603 | 1.10±0.10 | 1.90±0.10 | 1.50±0.10 | 3.50±0.05 | 4.00±0.10 | 4.00±0.10 | 2.00±0.05 | 8.00±0.20 | 0.60±0.03 |
| 0805 | 1.65±0.20 | 2.40±0.20 | 1.50±0.10 | 3.50±0.05 | 4.00±0.10 | 4.00±0.10 | 2.00±0.05 | 8.00±0.20 | 0.75±0.05 |
| 1206 | 1.90±0.20 | 3.50±0.20 | 1.50±0.10 | 3.50±0.05 | 4.00±0.10 | 4.00±0.10 | 2.00±0.05 | 8.00±0.20 | 0.75±0.05 |
| 1210 | 2.80±0.20 | 3.50±0.20 | 1.50±0.10 | 3.50±0.05 | 4.00±0.10 | 4.00±0.10 | 2.00±0.05 | 8.00±0.20 | 0.75±0.05 |

塑料带编带 Embossed Taping



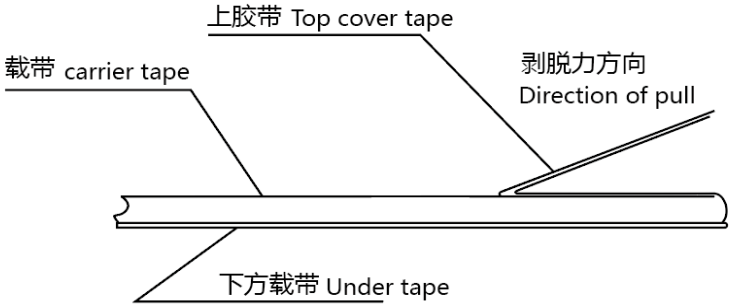

**Unit: mm**

| Dim | B0 | A0 | D0 | F | P0 | P | P1 | W | K0 |
|---|---|---|---|---|---|---|---|---|---|
| 1812 | 3.52±0.10 | 5.10±0.10 | 1.50±0.10 | 5.50±0.05 | 4.00±0.10 | 4.00±0.10 | 2.00±0.05 | 12.0±0.10 | 0.78±0.10 |
| 2010 | 2.75±0.10 | 5.40±0.10 | 1.50±0.10 | 5.50±0.05 | 4.00±0.10 | 4.00±0.10 | 2.00±0.05 | 12.0±0.10 | 0.75±0.10 |
| 2512 | 3.35±0.10 | 6.70±0.10 | 1.50±0.10 | 5.50±0.05 | 4.00±0.10 | 4.00±0.10 | 2.00±0.05 | 12.0±0.10 | 0.75±0.10 |

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

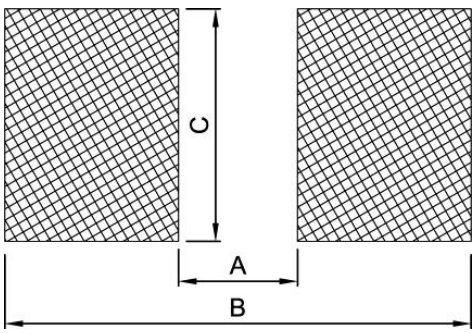
上胶带以 300mm/分钟的速度，沿 165∽180 度角的方向进行剥离，如下图所示。纸带的剥离力范围为 10g∽70g;
载带的剥离力范围 30∽100g。

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 paper carrier tape shall be 0.1N to 0.7N(10 to 70 g), the peel force of plastic carrier tape shall be 0.3N to 1N (30 to 100 g).




## ▪ 建议焊盘尺寸（Recommended Pad Dimensions）

| Land pattern / Type | Dimensions（mm） | | |
|---|---|---|---|
| | A | B | C |
| 0201 | 0.25~0.30 | 0.80~1.00 | 0.30~0.40 |
| 0402 | 0.50~0.60 | 1.30~1.60 | 0.40~0.60 |
| 0603 | 0.80~1.10 | 2.00~2.50 | 0.80~1.00 |
| 0805 | 1.00~1.40 | 2.90~3.40 | 1.00~1.40 |
| 1206 | 2.00~2.40 | 4.10~4.60 | 1.50~1.80 |
| 1210 | 2.00~2.40 | 4.10~4.60 | 2.50~3.00 |
| 1812 | 2.80~3.30 | 5.00~6.00 | 3.00~3.50 |
| 2010 | 3.40~3.90 | 5.70~6.50 | 2.50~3.00 |
| 2512 | 3.60~4.20 | 7.60~8.60 | 3.00~3.50 |



## ▪ 厚膜电阻器使用说明（Chip Resistor Instructions for use）

**本产品在以下特殊环境下应用，性能可能会受到影响：**
(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 $Cl_2$,$H_2S$,$NH_3$,$SO_2$,and $NO_2$,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,chenical 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 cheaner even if non cleaning flux.

### - 储存 / 搬运条件（Storage / Carry conditions）

1. 储存温度 25±5℃　　Temperature：25±5℃
2. 湿度 30%～70%RH　　Humidity：30%～70%RH
3. 储存期限：先进先出，2 年　　Storage life：2years FIFO
4. 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.

## 修订履历 (Revision History)

| 版本 Version | 修订日期 Revision Date | 修订内容 Revision Description | 版本确认 Version Checked |
|---|---|---|---|
| FJ-JS-3001-V1.0 | 2020/12/1 | 原版 The original version | 魏效振 Xiaozhen Wei |
| FJ-JS-3001-V2.0 | 2025/9/30 | 版本及格式修订 Version and format revision | 魏效振 Xiaozhen Wei |
| FJ-JS-3001-V3.0 | 2026/1/1 | 修订负荷寿命/温湿特性测试标准和条件<br>Revised Load life / Humidity test standard and Condition | 魏效振 Xiaozhen Wei |
| FJ-JS-3001-V4.0 | 2026.05.18 | 1. 上胶带剥离力由 200 改为 300<br>2. 增加“建议焊盘尺寸” | 张莎莎 ShaSha Zhang |
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