

**常规系列厚膜晶片电阻
Thick Film Chip Resistor
FRC Series**



■应用 (Application)

- Entertainment : Stereo,TV tuners , Tape recorder
- Appliance: Air conditioner, Refrigerator
- Computer & relative products : Main board, PDA
- Communication equipment: Cell phone, Fax machine
- Power equipment: Power supply , II Lumination equipment
- Measuring instrument: Electric meter,Navigation equipment

- 娱乐：立体声、电视调谐器、录音机
- 电器：空调、冰箱
- 电脑及相关产品：主板、PDA
- 通讯设备：手机、传真机
- 电源设备：电源、二级照明设备
- 测量仪器：电表、导航设备

■特点 (Features)

- small size and light weight
- Reliability, high quality

- 体积小、重量轻
- 可靠性，高质量

■产品料号 (Parts Number Explanation)

示例 (Example) : FRC1206F1001 TSD

| F 公司名 | R 产品别 | C 功能别 | 1206 尺寸 | F 公差 | 1001 字码 | T 包装别 | S 端电极 | D 特殊码 |
|-----------------|--|---|--|---|---|--|----------------------------|---------------------|
| FOJAN | R:Resistor C:Capacitor L:Inductor D:Diode A:Audion | C:Normal P:Hi-Power L:Lowohmic A:Array S:Surge H:Hi-Precision V:Hi-Voltage Q:Auto-motive R:Anti-sulfur M:Metal D: LED | 0201 0402 0603 0805 1206 1210 1218 1812 2010 2512 | B:±0.1% C:±0.25% D:±0.5% F:±1% J:±5% P: Jumper | ±5%:E24 3-digits+blank 102=1KΩ 1R0=1Ω ±1%&Below : E24+E96 : 4-digits 1001=1KΩ 1R00=1Ω | T: 7 inch reel Q:10 inch reel R:13 inch reel B:Bulk | S : Sn C : Cu A : Au | N:Normal D : LED |
| Company code | Type code | Functional code | Size code | Tolerance code | Resistance code | Packaging code | Termination code | Special Case |

■尺寸 (Dimension)

| 尺寸 dimension |  | | | | |
|-----------------|--|-----------|-----------|-----------|-----------|
| | 单位 (unit) : mm | | | | |
| 型别 (Type) | L | W | H | T1 | T2 |
| 0201 | 0.60±0.03 | 0.30±0.03 | 0.23±0.03 | 0.10±0.05 | 0.15±0.05 |
| 0402 | 1.00±0.05 | 0.50±0.05 | 0.35±0.05 | 0.20±0.10 | 0.25±0.10 |
| 0603 | 1.60±0.10 | 0.80±0.10 | 0.45±0.10 | 0.25±0.15 | 0.25±0.15 |
| 0805 | 2.00±0.10 | 1.25±0.10 | 0.50±0.10 | 0.35±0.20 | 0.35±0.20 |
| 1206 | 3.10±0.10 | 1.60±0.10 | 0.55±0.10 | 0.45±0.20 | 0.40±0.20 |
| 1210 | 3.10±0.10 | 2.60±0.15 | 0.55±0.10 | 0.45±0.15 | 0.50±0.20 |
| 1218 | 3.10±0.10 | 4.60±0.10 | 0.55±0.10 | 0.45±0.20 | 0.40±0.20 |
| 1812 | 4.50±0.20 | 3.10±0.20 | 0.55±0.10 | 0.55±0.20 | 0.70±0.20 |
| 2010 | 5.00±0.10 | 2.50±0.15 | 0.55±0.10 | 0.45±0.15 | 0.50±0.20 |
| 2512 | 6.35±0.10 | 3.10±0.15 | 0.55±0.10 | 0.60±0.20 | 0.50±0.20 |

■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 | 侧电极 Side conductive layer | 镍铬合金 NiCr |
| 4 | 阻体层 Resistive layer | 氧化钌+玻璃 RuO ₂ + glass |
| 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 Matte Tin |

■功率衰减曲线 (Derating Curve)

| 使用温度范围 | -55°C~+125°C(0201) | -55°C~+155°C |
|---------|----------------------------------|----------------------------------|
| 说明 | 周围温度若超过70°C至125°C之间,功率可照下图曲线予以修订 | 周围温度若超过70°C至155°C之间,功率可照下图曲线予以修订 |
| 功率衰减曲线图 | | |

■电气特性 (Electrical characteristics)

| 型别 Type | 0201 | 0402 | 0603 | 0805 | 1206 | 1210 | 1218 | 1812 | 2010 | 2512 |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 绝缘耐压 Dielectric Withstanding Voltage | - | 100V | 100V | 300V | 500V | 500V | 500V | 500V | 500V | 500V |
| 零欧姆阻值 ±1% Resistance Value of Jumper ±1% | - | <30mΩ | <30mΩ | <30mΩ | <30mΩ | <30mΩ | <30mΩ | <30mΩ | <30mΩ | <30mΩ |
| 零欧姆阻值 ±5% Resistance Value of Jumper ±5% | <50mΩ | <50mΩ | <50mΩ | <50mΩ | <50mΩ | <50mΩ | <50mΩ | <50mΩ | <50mΩ | <50mΩ |
| 零欧姆额定电流 Rated Current of Jumper | 0.5A | 1A | 1A | 2A | 2A | 2A | 6A | 2A | 2A | 2A |
| 零欧姆电阻最大电流 Max Current of Jumper | 1A | 2A | 2A | 5A | 10A | 10A | 10A | 10A | 10A | 10A |

■电性规格 (Standard Electrical Specifications)

| 型别 Type | 额定功率 (PowerRating at 70℃) | 最高 工作电压 Max. RCWV | 最大过负荷电压 Max. Overload Voltage | T.C.R. (PPM/°C) | 阻值范围 Resistance Range |
|------------|-----------------------------------|-------------------------|----------------------------------|--------------------|--------------------------|
| 0201 | 1/20W | 25V | 50V | ± 400 | 1Ω~10Ω |
| | | | | ± 200 | 10Ω~10MΩ |
| 0402 | 1/16W | 50V | 100V | ±200 | 1Ω~10Ω |
| | | | | ± 100 | 10MΩ~100MΩ |
| 0603 | 1/10W | 75V | 150V | ± 200 | 10Ω~10MΩ |
| | | | | ± 100 | 1Ω~10Ω |
| 0805 | 1/8W | 150V | 300V | ± 200 | 10MΩ~100MΩ |
| | | | | ± 100 | 1Ω~10Ω |
| 1206 | 1/4W | 200V | 400V | ± 200 | 10Ω~10MΩ |
| | | | | ± 100 | 1Ω~10Ω |
| 1210 | 1/3W | 200V | 400V | ± 200 | 10MΩ~100MΩ |
| | | | | ± 100 | 1Ω~10Ω |
| 1218 | 1W | 200V | 500V | ± 200 | 10Ω~1MΩ |
| | | | | ± 100 | 1Ω~10Ω |
| 1812 | 3/4W | 200V | 400V | ± 200 | 10MΩ~100MΩ |
| | | | | ± 100 | 1Ω~10Ω |
| 2010 | 3/4W | 200V | 400V | ± 200 | 10Ω~10MΩ |
| | | | | ± 100 | 10MΩ~100MΩ |
| 2512 | 1W | 200V | 400V | ± 200 | 1Ω~10Ω |
| | | | | ± 100 | 10MΩ~100MΩ |

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■性能 (Performance Specifications)

| 内容 Item | 测试方法 Test Methods | 测试条件 Test Conditions | 规格 Specification |
|---|----------------------|---|---|
| 温度系数 Temperature Coefficient | JIS C 5201 4.8 | $TCR = (R - R_0) / (t - t_0) R_0 \times 10^6$ (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℃) | 0201 规格 : $1\Omega \leq R \leq 10\Omega$: ± 400 PPM/℃ $10\Omega < R \leq 10M\Omega$: ± 200 PPM/℃ 0402~2512 规格 : $1\Omega \leq R \leq 10\Omega$: ± 200 PPM/℃ $10\Omega < R \leq 10M\Omega$: ± 100 PPM/℃ $10M\Omega < R \leq 100M\Omega$: ± 200 PPM/℃ |
| 短时间过负荷 Short-time overload | JIS C 5201 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。 Applied 2.5 times of rated voltage for 5 second. Measure the variation of resistance. | $\pm(1.00\% + 0.05\Omega)$ |
| 焊锡性 Solderability | JIS C 5201 4.17 | 沾助焊剂后浸入锡炉，锡炉温度 245±5℃，时间 3±0.5 秒。 Dip the terminal in a flux and then dip into a soldering bath at 245±5℃ for 3±0.5sec. | > 95%面积上锡 (> 95% coverage) |
| 抗焊锡热 Resist to soldering heat | JIS C 5201 4.18 | 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. | $\pm(1.00\% + 0.05\Omega)$ |
| 绝缘电阻 Insulation resistance | JIS C 5201 4.6 | 电阻本体上加载绝缘耐压 60±5 秒后，测量绝缘电阻。 Applied the dielectric withstanding voltage on the center of body for 60±5seconds. Then measure insulation resistance. | >10GΩ |
| 绝缘耐压 Dielectric withstanding voltage | JIS C 5201 4.7 | 电阻本体上加载绝缘耐压 60±5 秒。 Applied the dielectric withstanding voltage on the center of body for 60±5seconds. | 无击穿、飞弧及可见机械性损伤 No evidence of flashover, mechanical damage arcing or insulation breakdown |

| 内容 Item | 测试方法 Test Methods | 测试条件 Test Conditions | 规格 Specification |
|--------------------------------|---------------------------|---|---------------------|
| 端子弯曲 Terminalbending | JIS C 5201 4.33 | 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; 量测试前后 阻值变化率 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) |
| 温度循环 Temperature Cycling | JIS C 5201 4.19 | 电阻放入温度循环机中,温度 155±2℃至 -55±3℃,共 5 个循环。量测试前后阻值变化率。 Put specimen in a chamber which temperature can be changed to 155±2℃ or -55±3℃, repeated 5 times. Measure the variation of resistance. | ±(2.00% +0.05Ω) |
| 耐湿特性 Humidity | JIS C 5201 4.24 | 电阻放入恒温恒湿箱,温度 40±2℃,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 测试前后阻值变化率。 Put the specimen in a chamber at 40±2℃ 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} H. Measure the variation of resistance. | ±(2.00% +0.05Ω) |
| 负荷寿命 Load life | JIS C 5201 4.25.1 | 电阻放入恒温箱中,温度 70±2℃, ON TIME:1.5H, OFF TIME:0.5H 通电额定电压 1000 ^{+24/-0} 小时,量测试前后阻值变化率。 Put the specimen in a chamber at 70±2℃ temperature, ON TIME:1.5H, OFF TIME:0.5H, and applied rated voltage for 1000 ^{+24/-0} H. Measure the variation of resistance. | ±(2.00% +0.05Ω) |
| 温湿循环 Moisture resistance | MIL-STD-202 METHOD 106 | 25℃~65℃,90~100%RH, 2.5 小时; 65℃ 90~100%RH, 3 小时; 65℃~25℃,80~100%RH,2.5 小时,10 个循环,试 验结束 24±4 小时后进行测试。 25℃~65℃,90~100%RH, 2.5H; 65℃ 90~100%RH, 3H; 65℃~25℃ 80~100%RH, 2.5H, 10 cycles, Measurement at 24±4 hours after test conclusion. | ±(2.00% +0.05Ω) |

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