

## 高压厚膜晶片电阻 High Voltage Thick Film Chip Resistor FRV Series



### 应用(Application)

- Powersupply,Industrialcontrolsystem
- Measurementinstrument
- Back lightinverter
- Medical, Precisionequipments
- 电源、工控系统
- 测量仪器
- 背光逆变器
- 医疗、精密设备

### 特性(Features)

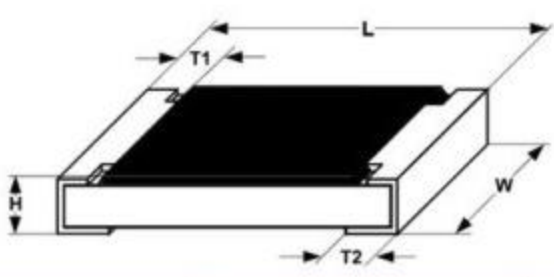
- Small size and light weight
- Reliability, high quality
- Specialmaterialanddesignforhighworkingvoltage require
- 体积小，重量轻
- 可靠性，高质量
- 对高工作电压要求的特殊材质和设计

### 料号说明(Parts Number Explanation) :

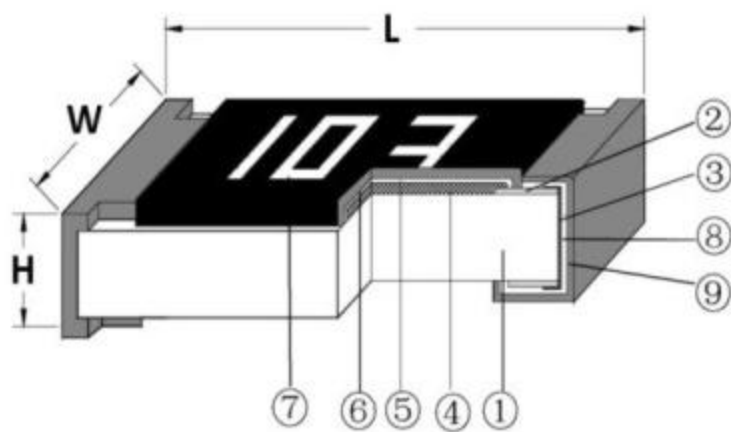
示例 Example: FRV1206J103 TS

| <b>E</b><br>公司名 | <b>R</b><br>产品别  | <b>V</b><br>功能别  | <b>1206</b><br>型别                            | <b>J</b><br>公差   | <b>103</b><br>字码  | <b>I</b><br>包装别  | <b>S</b><br>端电极            | 特殊型                 |
|-----------------|--|--|--|--|---|--|----------------------------|---------------------|
| FOJAN           | R:Resistor<br>C:Capacitor<br>L:Inductor<br>D:Diode<br>A:Audion | C:Normal<br>P:Hi-Power<br>L:Lowohmic<br>A:Array<br>S:Surge<br>H:Hi-Precision<br>V:Hi-Voltage<br>Q:Auto-motive<br>R:Anti-sulfur<br>M:Metal<br>D:(LED) | 0603<br>0805<br>1206<br>1210<br>2010<br>2512 | B:±0.1%<br>C:±0.25%<br>D:±0.5%<br>F:±1%<br>J:±5%<br>P : Jumper | ±5%:E24<br>3-digits+blank<br>102=1KΩ<br>1R0=1Ω<br>±1%&Below :<br>E24+E96 :<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 | N:Normal<br>D : LED |
| Company code    | Type code  | Functional code  | Size code                                    | Tolerance code   | Resistance code   | Packaging code   | Termination code           | Special code        |

■尺寸 (Dimension)

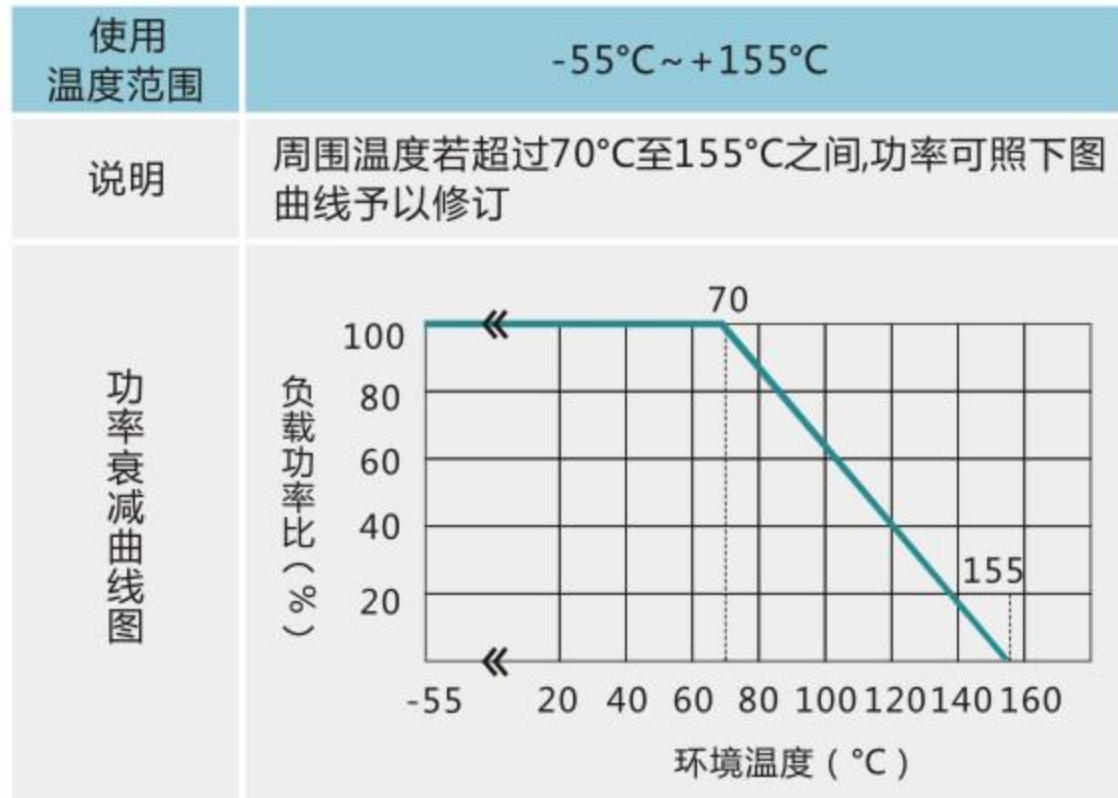
| 尺寸<br>dimension |  |           |           |           |           |
|-----------------|--|-----------|-----------|-----------|-----------|
|                 | 单位 (unit) : mm   |           |           |           |           |
| 型别 ( Type )     | L  | W         | H         | T1        | T2        |
| 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 |
| 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<br>construction             | 主要材料<br>Major material                  |
|-----|--------------------------------|---|
| 1   | 陶瓷基板<br>Ceramic substrate      | 三氧化二铝<br>Al <sub>2</sub> O <sub>3</sub> |
| 2   | 银电极<br>Conductive layer        | 银<br>Ag                                 |
| 3   | 侧电极<br>Side conductive layer   | 镍铬合金<br>NiCr                            |
| 4   | 阻体层<br>Resistive layer         | 氧化钌+玻璃<br>RuO <sub>2</sub> + glass      |
| 5   | 内保护层<br>Inner protective layer | 玻璃<br>Glass                             |
| 6   | 外保护层<br>Outer Protective layer | 环氧树脂<br>Epoxy                           |
| 7   | 文字<br>Marking                  | 环氧树脂<br>Epoxy                           |
| 8   | 镍电极<br>Ni plating layer        | 镍<br>Ni                                 |
| 9   | 锡电极<br>Sn plating layer        | 锡<br>Matte Tin                          |

■功率衰减曲线 ( Derating Curve )



■电气特性 ( Electrical characteristics )

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

■电性规格 ( Standard Electrical Specifications )

| 型别 Type | 额定功率<br>( Power Rating at 70°C ) | 最高工作电压<br>Max. RCWV | 最大过负荷电压<br>Max. Overload Voltage | T.C.R.<br>(PPM/°C) | 阻值范围<br>Resistance Range |
|---------|----------------------------------|---------------------|----------------------------------|--------------------|--------------------------|
| 0603    | 1/10W                            | 350V                | 500V                             | ±200PPM/°C         | 47Ω~10MΩ                 |
| 0805    | 1/8W                             | 400V                | 800V                             |                    |                          |
| 1206    | 1/4W                             | 500V                | 1000V                            |                    |                          |
| 1210    | 1/3W                             | 500V                | 1000V                            |                    |                          |
| 2010    | 3/4W                             | 500V                | 1000V                            |                    |                          |
| 2512    | 1W                               | 500V                | 1000V                            |                    |                          |

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■性能 ( Performance Specifications )

| 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<br>Coefficient      | JIS C 5201 4.8       | $TCR = (R - R_0) / (t - t_0) R_0 \times 10^6$ (ppm)<br>$R_0$ 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>$t_0$ 室温(room temperature)<br>$t$ 测试温度 ( test temperature 125℃ or -55℃ ) | 47Ω<R≦10MΩ:<br>±200 PPM/℃  |
| 短时间过负荷<br>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。<br>Applied 2.5 times of rated voltage for 5 second. Measure the variation of resistance.   | ±(1.00% +0.05Ω)  |
| 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。<br>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<br>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。<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       | 电阻本体上加载绝缘耐压 60±5 秒后, 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       | 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 for 60±5seconds.  | 无击穿、飞弧及可见机械性损伤<br>No evidence of flashover, mechanical damage arcing or insulation breakdown |

| 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    | 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)     |
| 温度循环<br>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。量测试验前后阻值变化率。<br>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<br>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 <sup>+48/-0</sup> 小时。量测试验前后阻值变化率。<br>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 <sup>+48/-0</sup> H. Measure the variation of resistance. | ±(2.00% +0.05Ω)     |
| 负荷寿命<br>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 <sup>+24/-0</sup> 小时,量测试验前后阻值变化率。<br>Put the specimen in a chamber at 70±2℃ temperature, ON TIME:1.5H, OFF TIME:0.5H, and applied rated voltage for 1000 <sup>+24/-0</sup> H. Measure the variation of resistance.   | ±(2.00% +0.05Ω)     |
| 温湿循环<br>Moisture resistance | MIL-STD-202 METHOD 106 | 25℃~65℃,90~100%RH, 2.5 小时;<br>65℃ 90~100%RH, 3 小时;<br>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。<br>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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