

低阻厚膜晶片电阻 Low Resistance Thick Chip Resistor FRL 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、掌上电脑
- 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
- Low Resistance & Suitable for Large Current Application
- Ultra-low Value

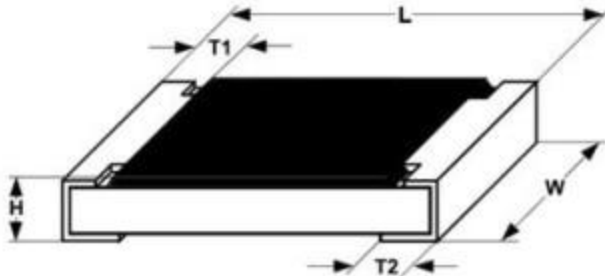
- 体积小，重量轻
- 可靠性，高质量
- 低阻值，适合大电流通过
- 超低阻值

■料号说明 (Parts Number Explanation) :

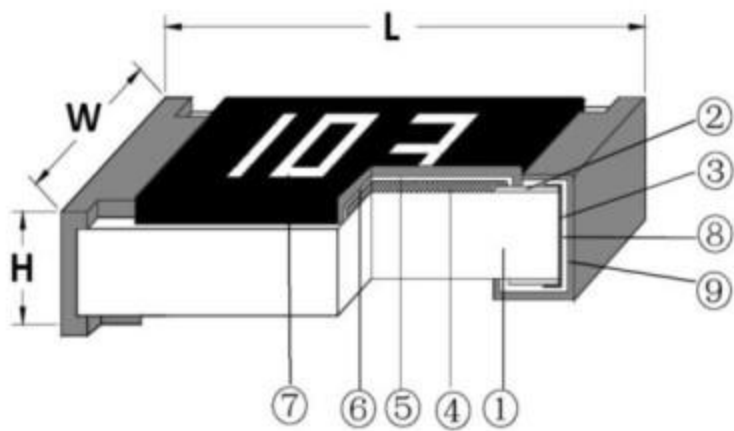
示例 Example: FRL1206JR470 TS

F 公司名	R 产品别	L 功能别	1206 型别	F 公差	R470 字码	I 包装别	S 端电极	特殊型
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	0402 0603 0805 1206 1210 2010 1812 2512	B:±0.1% C:±0.25% D:±0.5% F:±1% J:±5% P : Jumper	0603:E24/E96 3-digits+blank R10=100mR R91=910mR 02Z=102mR Others type: E24/E96 4-digits R100=100mR R102=102mR R910=910mR	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 code

尺寸 (Dimension)

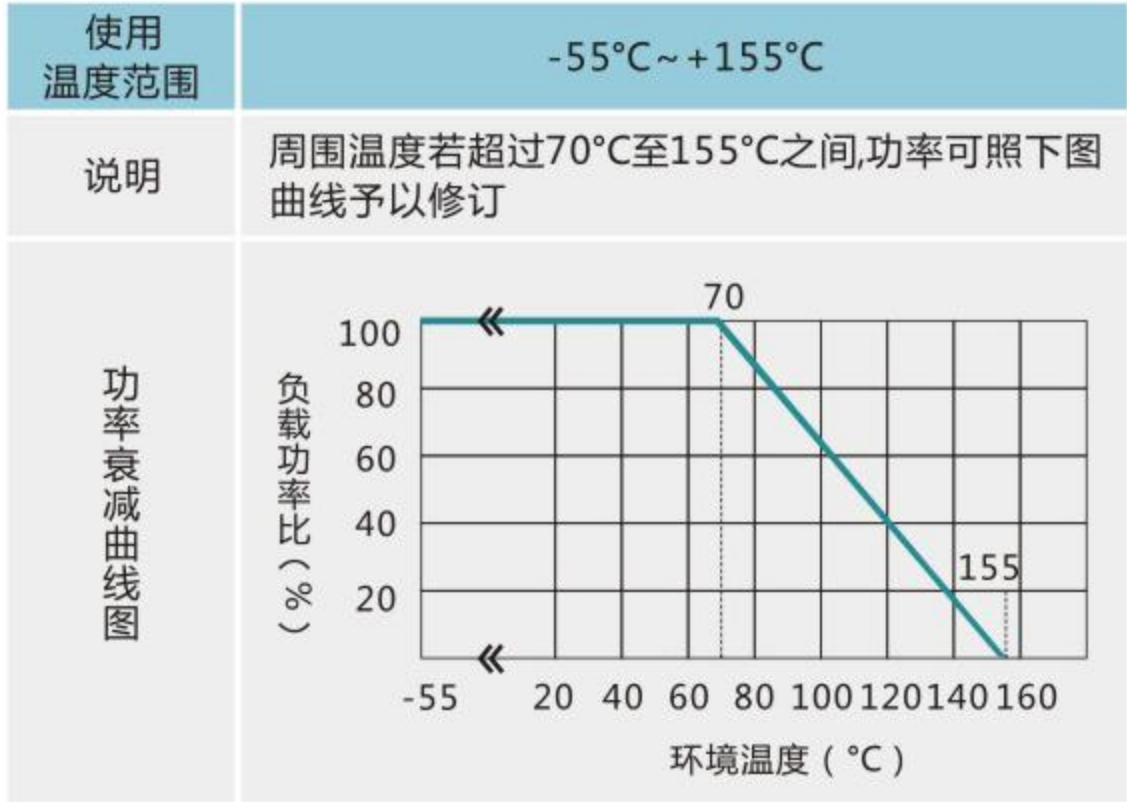
尺寸 dimension						单位 (unit) : mm
型别 (Type)	L	W	H	T1	T2	
0402	1.00±0.05	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10	
0603	1.60±0.10	0.80±0.10	0.45±0.10	0.25±0.15	0.25±0.15	
0805	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.35±0.20	
1206	3.10±0.10	1.60±0.10	0.55±0.10	0.45±0.20	0.40±0.20	
1210	3.10±0.10	2.60±0.15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



■电气特性 (Electrical characteristics)

型别 Type	额定功率 (Power Rating at 70℃)	绝缘耐压 Dielectric Withstan ding Voltage	额定电流 Rated Current of Jumper	最大电流 Max Current of Jumper	T.C.R. (PPM/℃)	阻值范围 Resistance Range
0402	1/16W	100V	0.79A	1.97A	0.02Ω~0.06(含): ±1200PPM/℃ 0.06Ω~0.2(含): ±600PPM/℃ 0.2Ω~0.5(含): ±300PPM/℃ >0.5Ω:±200PPM/℃	0R1~1Ω
0603	1/10W	100V	2.23A	5.59A		0R01~1Ω
0805	1/8W	300V	2.5A	6.25A		
1206	1/4W	500V	3.53A	8.83A		
1210	1/3W	500V	5A	12.50A		
2010	3/4W	500V	6.12A	15.30A		
2512	1W	500V	7.07A	17.67A		

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.

■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℃)	0.02Ω~0.06(含): ±1200PPM/℃ 0.06Ω~0.2(含): ±600PPM/℃ 0.2Ω~0.5(含): ±300PPM/℃ >0.5Ω: ±200PPM/℃
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.	±(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。 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.	±(1.00% +0.05Ω)

内容 Item	测试方法 Test Methods	测试条件 Test Conditions	规格 Specification
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，测量绝缘阻抗。 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
端子弯曲 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)

内容 Item	测试方法 Test Methods	测试条件 Test Conditions	规格 Specification
耐湿特性 Humidity	JIS C 5201 4.24	电阻放入恒温恒湿箱，温度 $40\pm 2^{\circ}\text{C}$，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。量测试验前后阻值变化率。 Put the specimen in a chamber at $40\pm 2^{\circ}\text{C}$ 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.	$\pm(2.00\% +0.05\Omega)$
负荷寿命 Load life	JIS C 5201 4.25.1	电阻放入恒温箱中，温度 $70\pm 2^{\circ}\text{C}$，ON TIME:1.5H，OFF TIME:0.5H，通电额定电压 $1000^{+24}/_{-0}$ 小时，量测试验前后阻值变化率。 Put the specimen in a chamber at $70\pm 2^{\circ}\text{C}$ temperature, ON TIME:1.5H，OFF TIME:0.5H，and applied rated voltage for $1000^{+24}/_{-0}$H. Measure the variation of resistance.	$\pm(2.00\% +0.05\Omega)$
温湿循环 Moisture resistance	MIL-STD-202 METHOD 106	$25^{\circ}\text{C}\sim 65^{\circ}\text{C}$, 90~100%RH, 2.5 小时; 65°C 90~100%RH, 3 小时; $65^{\circ}\text{C}\sim 25^{\circ}\text{C}$, 80~100%RH, 2.5 小时, 10 个循环, 试验结束 24 ± 4 小时后进行测试。 $25^{\circ}\text{C}\sim 65^{\circ}\text{C}$, 90~100%RH, 2.5H; 65°C 90~100%RH, 3H; $65^{\circ}\text{C}\sim 25^{\circ}\text{C}$ 80~100%RH, 2.5H, 10 cycles, Measurement at 24 ± 4 hours after test conclusion.	$\pm(2.00\% +0.05\Omega)$