



富捷科技
FOJAN

Product Datasheet

产品规格说明书

FRD Series

LED Thick Film Chip Resistor

LED 厚膜片式电阻器

安徽省富捷电子科技有限公司

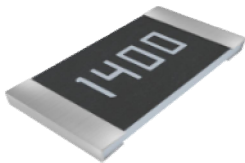
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LED 厚膜片式电阻器
Thick Film Chip Resistor
FRD Series

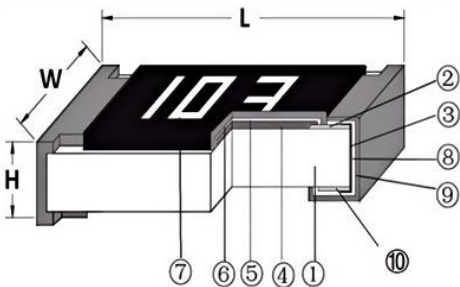


- 应用 (Application)
- 广泛应用于 LED 照明电子产品等领域。
 - Widely used in LED lighting electronics etc.

产品料号 (Parts Number Explanation) 示例: FRD1206J151 TS

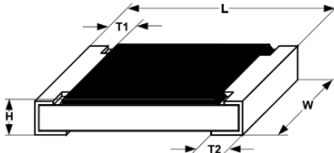
F 公司名	RD 产品别	1206 尺寸	F 公差	151 字码	T 包装别	S 端电极	特殊码
FOJAN	RD: LED 照明	0805 1206	F:±1% J:±5%	±5%:E24 3-digits+blank 102=1KΩ 1R0=1Ω ±1%&Below: E24+E96: 4-digits 1001=1KΩ 1R00=1Ω	T: 7 inch reel Q:10 inch reel R:13 inch reel B:Bulk	S: Sn C: Cu A: Au	Blank: none
Company	Product Type	Size	Tolerance	Resistance	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	氧化铝 Al ₂ O ₃
2	银电极 Conductive layer(Back)	银 Ag
3	银电极 Conductive layer (Top)	银 Ag
4	侧电极 Side conductive layer	镍铬合金 NiCr
5	阻体层 Resistive layer	Ruo ₂ , Ag, Pd
6	内保护层 Inner protective layer	玻璃 Glass
7	外保护层 Outer Protective layer	环氧树脂 Epoxy
8	文字 Marking	环氧树脂 Epoxy
9	镍电极 Ni plating layer	镍 Ni
10	锡电极 Sn plating layer	锡 Tin

尺寸 (Dimension):

尺寸 Dimension						
		单位 (unit) : mm				
型别 (Type)		L	W	H	T1	T2
英制	公制					
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	0.75±0.15

电气特性 (Electrical characteristics)

型别 Type	70℃ 下额定功率 Rated Power at 70℃	最大工作电压 Max Working Voltage	最大过负荷电压 Max Overload Voltage	阻值范围 Resistance Range
0805	1/8W	150V	300V	1Ω-10MΩ
1206	1/4W	200V	400V	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)

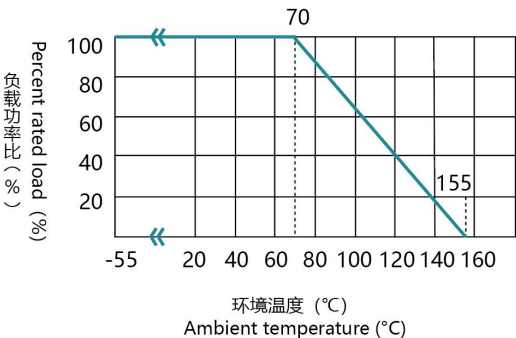
P: 额定功率 (Rated Power) (W)

R: 电阻阻值 (Resistance) (ohm)

如果计算出的电压超过此型别的最大工作电压, 则此型别的最大工作电压为此电阻的额定电压。

In case the value calculated by the formula exceed the maximum working voltage as above table 8, 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 usage range	-55℃~+155℃
说明 Describe	周围温度若超过 70℃至 155℃之间,功率可照下图曲线予以修订 If the ambient temperature exceeds 70℃ to 155℃, 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%	±2%	±5%
0805/1206	$1\Omega \leq R < 10\Omega$	±400		
	$10\Omega \leq R < 10M\Omega$	±200		

■ 性能 (Performance)

内容 Item	测试方法 Test Methods	测试条件 Test Conditions	规格 Specification
温度系数	JIS C 5201 4.8	$TCR = (R - R_0) / (t - t_0) R_0 \times 10^6$ (ppm) R0: 电阻在室温下的阻值 R: 电阻在 125°C 或 -55°C 下的阻值 (resistance at 125°C or -55°C) t0: 室温/t: 测试温度	As SEPC
短时间过负荷	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。	±(3.0%+0.05Ω)
焊锡性	JIS C 5201 4.17	沾助焊剂后浸入锡炉, 锡炉温度 245±5°C, 时间 3 ±0.5 秒。	> 95% 面积上锡 (> 95% coverage)
抗焊锡热	JIS C 5201 4.18	沾助焊剂后浸入锡炉, 锡炉温度 260±5°C, 时间 10±0.5 秒, 测量试验前后的阻值变化率。	±(3.00% + 0.05Ω)
绝缘电阻	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。	> 10GΩ
绝缘耐压	JIS C 5201 4.7	电阻本体上加载绝缘耐压 60±5 秒。	无击穿、飞弧可见机械性损伤
端子弯曲	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 8+0.2/0 mm	±(3.00% + 0.05Ω)
耐湿特性	JIS C 5201 4.24	电阻放入恒温恒湿箱, 温度 40±2°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。	±(3.0%+0.05Ω)
负荷寿命	JIS C 5201 4.25.1	电阻放入恒温箱中, 温度 70±2°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。	±(3.0%+0.05Ω)
端电极强度	AEC-Q200-006	测试条件为施加 3.0kg 的推力维持 60±1sec	外观无破损或裂痕

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

1.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

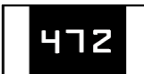
±5% tolerance product: the marking is 3 digits, the first 2 digits are significant figures of resistance value and the 3rd one denotes the power number of 10, (10X)

2.±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)

3.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 = $47 \times 10^2 = 4.7\text{K}\Omega$



10Ω以下标示: 5R6 = 5.6Ω
Below 10Ω: 5R6 = 5.6Ω



4992 = $499 \times 10^2 = 49.9\text{K}\Omega$



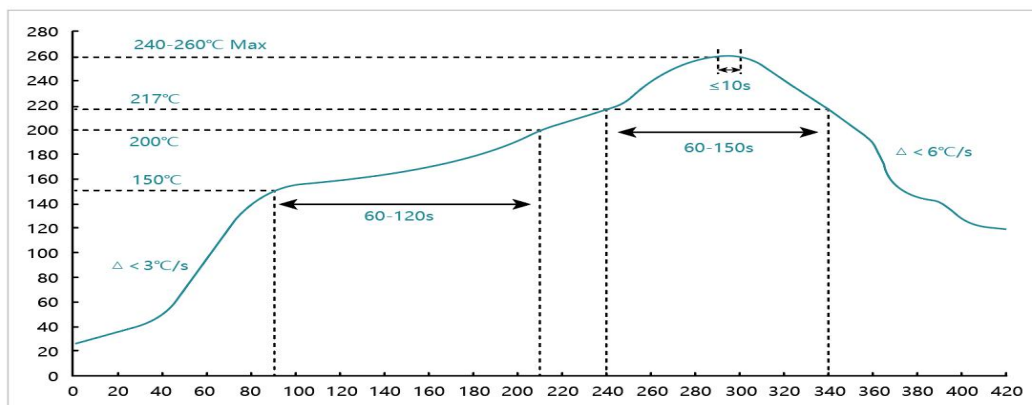
100Ω以下标示
6R81 = 6.81Ω
Below 100Ω: 6R81 = 6.81Ω



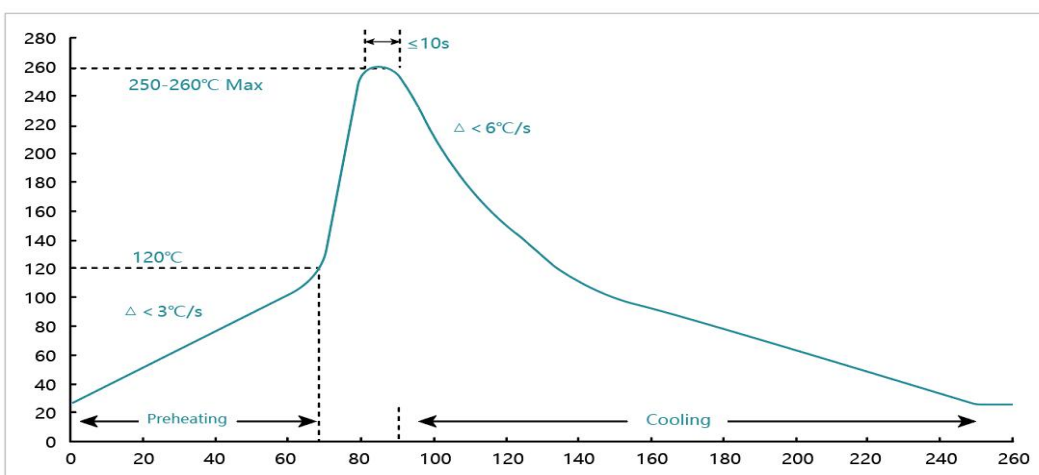
0Ω = 0

■ 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)

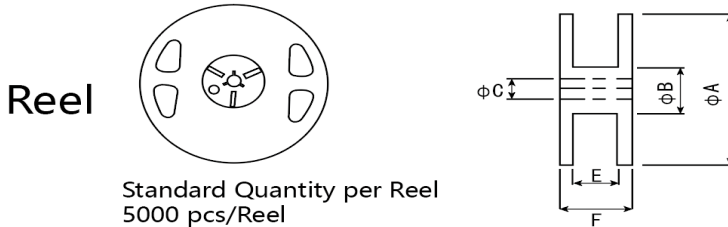


- 手工焊温度 (hand soldering temperature)

烙铁温度 $350\pm 10^{\circ}\text{C}$ 3 秒之内, 避免烙铁接触电阻本体

The iron temperature is $350\pm 10^{\circ}\text{C}$, hand soldering time less than 3S. Avoid solder iron tip direct touch the components body

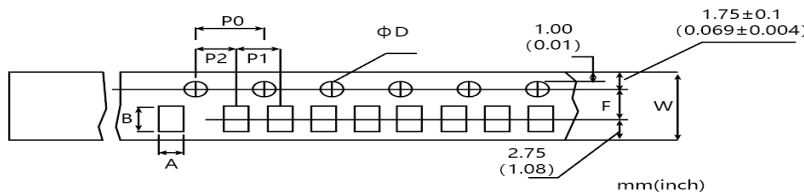
■ 包装规格 (Tapping Specification)



- 卷盘尺寸 (Reel dimension)

Type	Size		Unit	A	B	C	F	W
0805/1206	7"	5K/Reel	mm	178±2.0	60.0±1.0	13.5±0.5	11.4±0.1	9.00±0.3
	10"	10K/Reel	mm	254±2.0	100.0±1.0	13.5±0.5	11.4±0.1	9.00±0.3
	13"	20K/Reel	mm	330±2.0	100.0±1.0	13.5±0.5	11.4±0.1	9.00±0.3

- 包装尺寸 (packing dimension)



Unit: mm

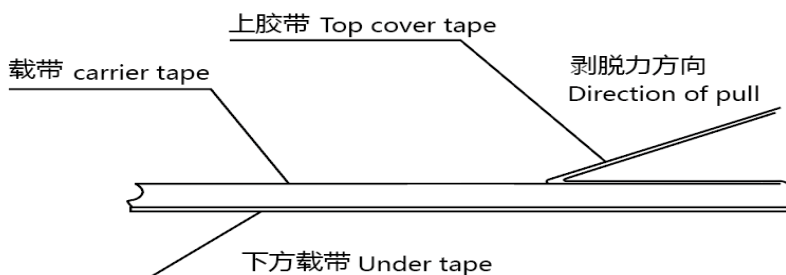
Dim	A	B	D	F	P0	P1	P2	W	T
0805	1.65 ± 0.20	2.40 ± 0.20	1.50 ± 0.10	3.50 ± 0.05	4.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	8.00 ± 0.20	0.75 ± 0.20
1206	1.90 ± 0.20	3.50 ± 0.20	1.50 ± 0.10	3.50 ± 0.05	4.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	8.00 ± 0.20	0.75 ± 0.20

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

上胶带以 200mm/分钟的速度, 沿 $165\sim 180$ 度角的方向进行剥离, 如下图所示。纸带的剥离力范围为 $10\text{g}\sim 70\text{g}$;

载带的剥离力范围 $30\sim 100\text{g}$ 。

The top cover tape is pulled at a speed of 200 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)



■ 厚膜电阻器使用说明 (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：

(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 $25\pm 5^\circ\text{C}$ Temperature: $25\pm 5^\circ\text{C}$
2. 湿度 30~70%RH Humidity: 30~70%RH
3. 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)

[illegible]