

■ 抗浪涌厚膜晶片电阻 (Anti-Surge Thick Film Chip Resistor)



■ 应用(Application)

- Telecommunications
- Power supplies
- Car electronics
- 电信
- 电源供应器
- 汽车电力

■ 特性(Features)

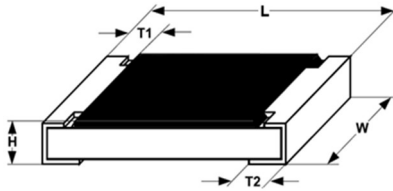
- Small size and light weight
- Reliability, high quality
- Special material and design for high working voltage require
- 体积小, 重量轻
- 可靠性, 高质量
- 对高工作电压要求的特殊材质和设计

■ 料号说明(Parts Number Explanation):

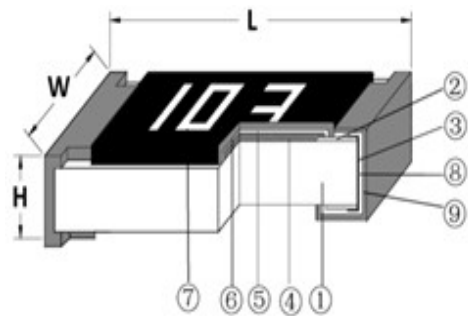
示例 Example: FRS1206J103 TS

F 公司名	R 产品别	S 功能别	1206 型别	J 公差	103 字码	T 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	0603 0805 1206 1210 2010 2512	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	Blank: None
Company code	Type code	Functional code	Size code	Tolerance code	Resistance code	Packaging code	Termination code	Special code

尺寸 (Dimension)

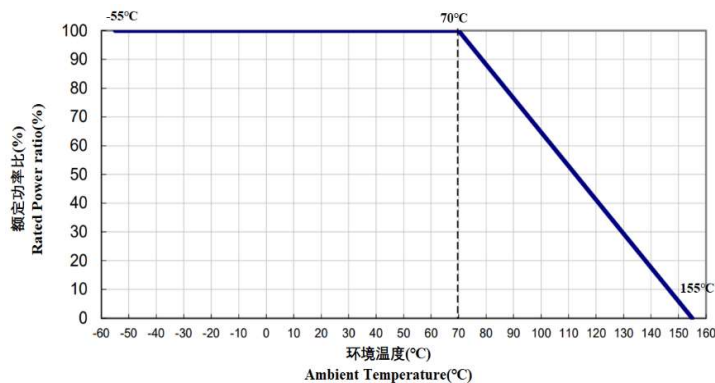
尺寸 dimension					
	单位 (unit) : mm				
型别 (Type)	L	W	H	T1	T2
0603	1.60±0.10	0.80±0.10	0.45±0.10	0.25±0.15	0.25±0.15
0805	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.35±0.20
1206	3.10±0.10	1.60±0.10	0.55±0.10	0.45±0.20	0.40±0.20
1210	3.10±0.10	2.50±0.15	0.55±0.10	0.45±0.15	0.50±0.20
2010	5.00±0.10	2.50±0.15	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	0.90±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	氧化钨+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)



Note: Operating temperature range is from -55°C to +155°C

■ 电性规格 (Standard Electrical Specifications)

型别 Type	额定功率 Power Rating at 70°C	最高 工作电压 Max. RCWV	最大 过负荷电压 Max. Overload Voltage	阻值范围 Resistance Range			TCR (PPM/°C)
				±0.5% (E24,E96)	±1% (E24,E96)	±5% (E24)	
0603	1/10W	75V	150V	10Ω~294Ω	1Ω~294Ω	1Ω~270Ω	±200
				300Ω~10MΩ			±100
0805	1/8W	150V	300V	10Ω~294Ω	1Ω~294Ω	1Ω~270Ω	±200
				300Ω~10MΩ			±100
1206	1/4W	200V	400V	10Ω~20Ω	1Ω~20Ω		±200
				20.5Ω~10MΩ			±100
1210	1/2W	200V	400V	10Ω~20Ω	1Ω~20Ω		±200
				20.5Ω~10MΩ			±100
2010	3/4W	400V	800V	10Ω~20Ω	1Ω~20Ω		±200
				20.5Ω~10MΩ			±100
2512	1W	500V	1000V	10Ω~20Ω	1Ω~20Ω		±200
				20.5Ω~10MΩ			±100

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.

Operating Voltage= $\sqrt{P \cdot R}$ or Max. Operating Voltage listed above, whichever is lower.

Overload Voltage= $2.5 \cdot \sqrt{P \cdot R}$ or Max. Overload Voltage listed above, whichever is lower

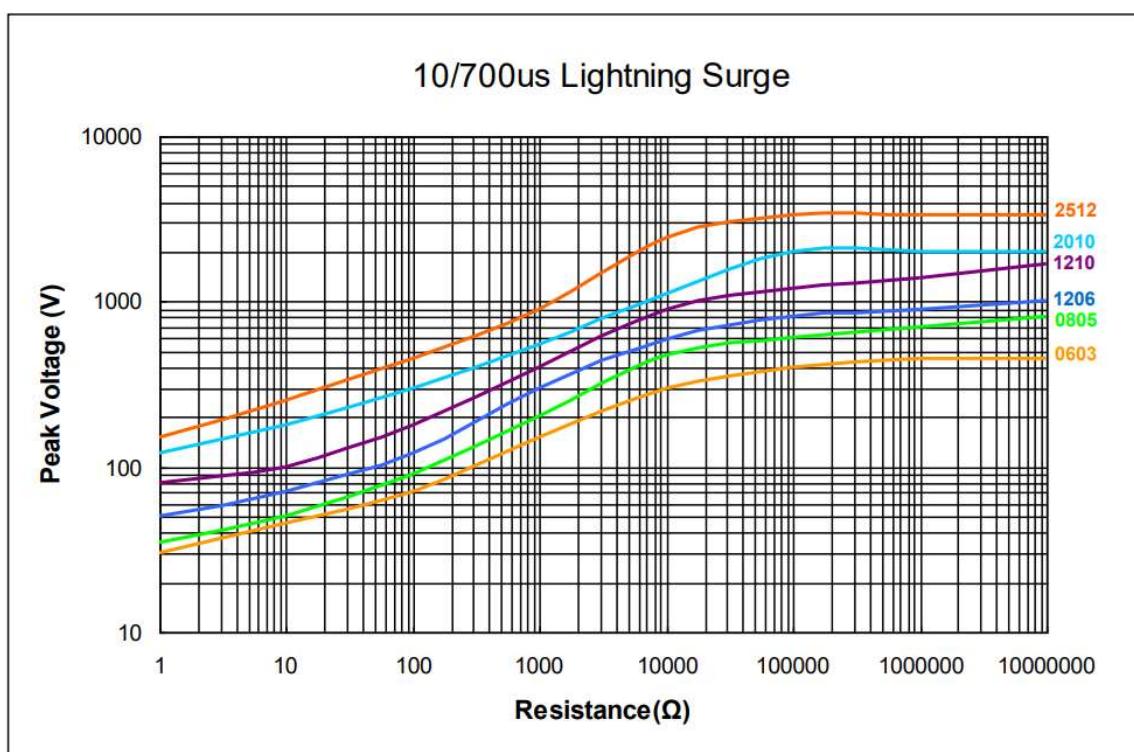
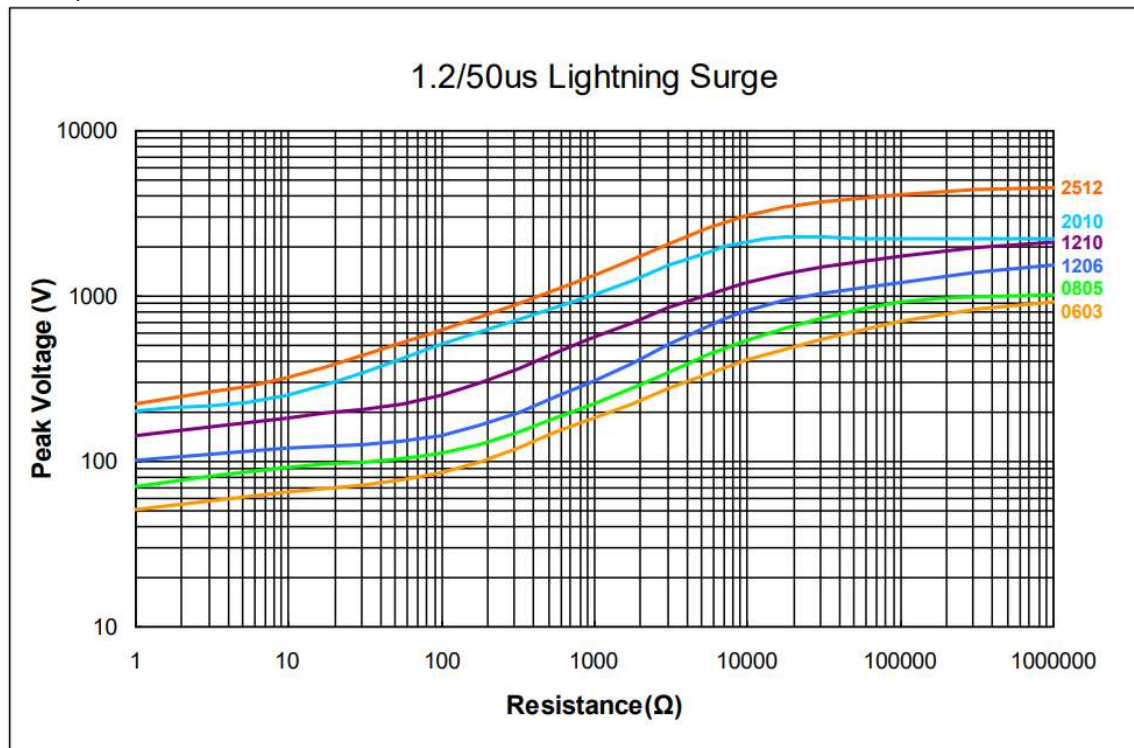
■ 雷电浪涌 (Lightning Surge)

雷电冲击电阻器根据 IEC 60115-1 使用 1.2/50us 和 10/700 脉冲形状进行测试

Resistors are tested in accordance with IEC 60115-1 using both 1.2/50us and 10/700 pulse shapes.

接受极限是电阻从初始值偏移小于 1%

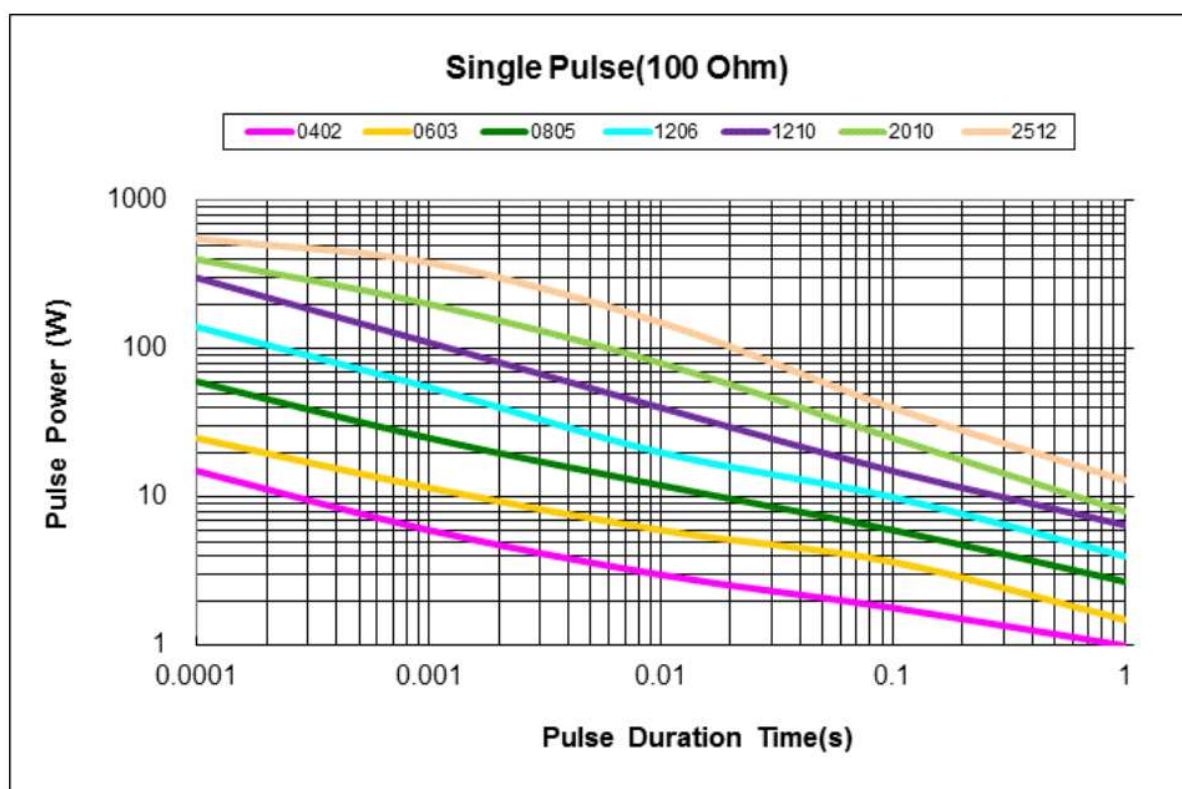
The limit of acceptance is a shift in resistance of less than 1% from the initial value



■ 耐脉冲能力 (Pulse withstanding capacity)

接受极限是电阻从初始值偏移不到 1%。施加的功率取决于所示最大允许冲击电压图的限制

The limit of acceptance was a shift in resistance of less than 1% from the initial value. The power applied was subject to the restrictions of the maximum permissible impulse voltage graph shown

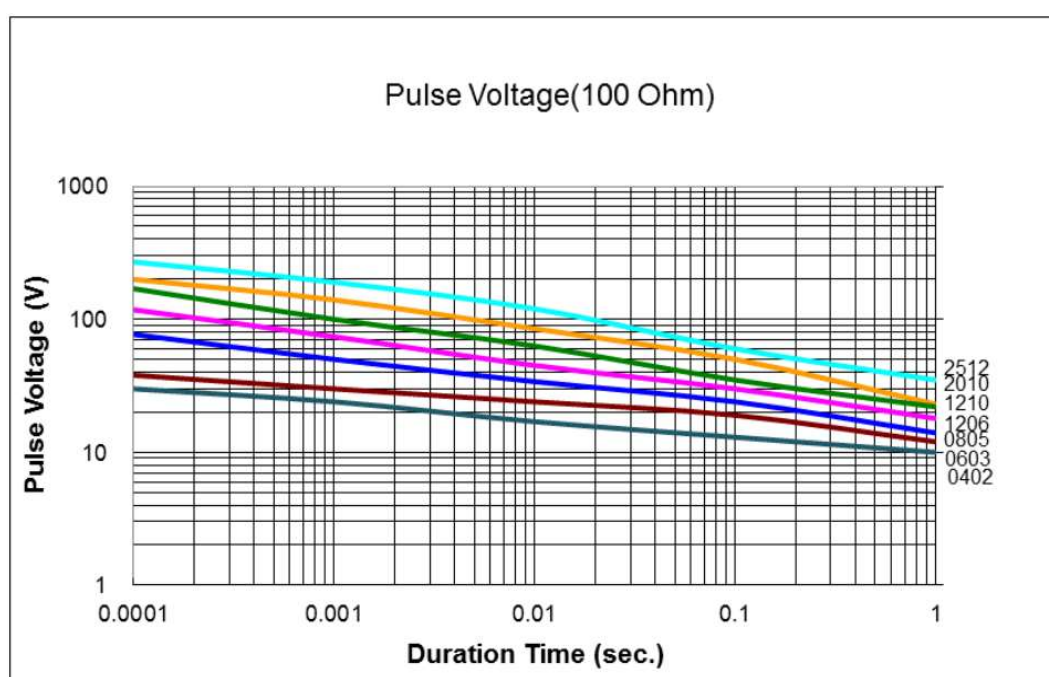
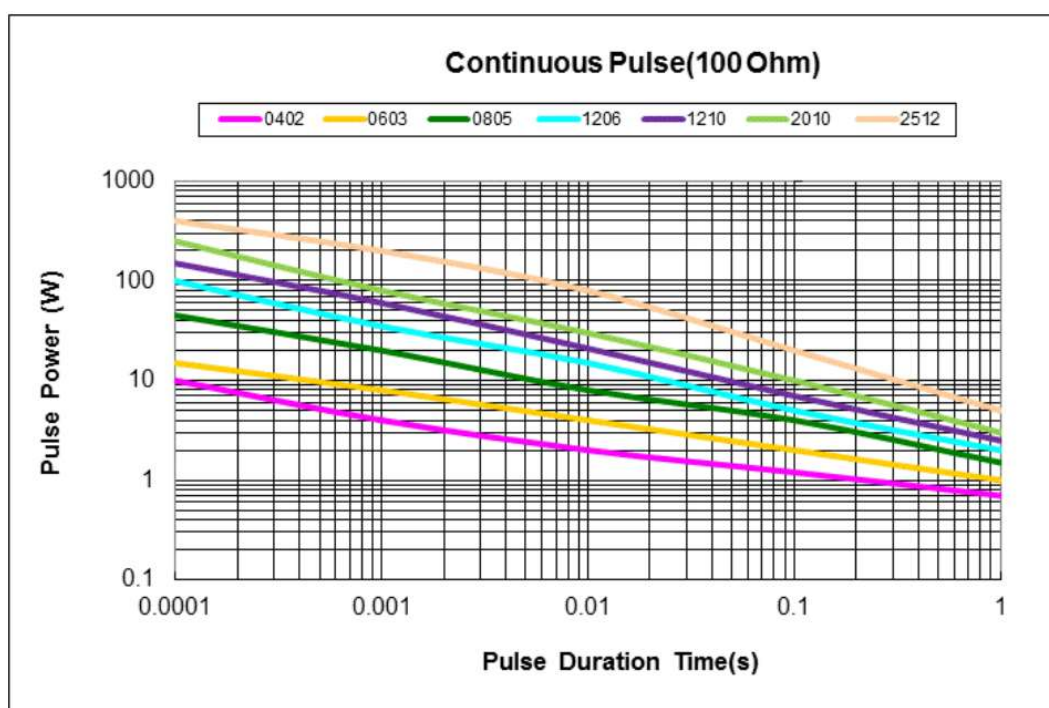


■ 连续脉冲 (Continuous Pulse)

通过施加重复的矩形脉冲来获得连续负载图，其中脉冲周期被调整为电阻器中消耗的平均功率等于 70°C 时的额定功率

电阻比初始值低 1%

The continuous load graph was obtained by applying repetitive rectangular pulses where the pulse period was adjusted so that the average power dissipated in the resistor was equal to its rated power at 70°C. Again the limit of acceptance was a shift in resistance of less than 1% from the initial value



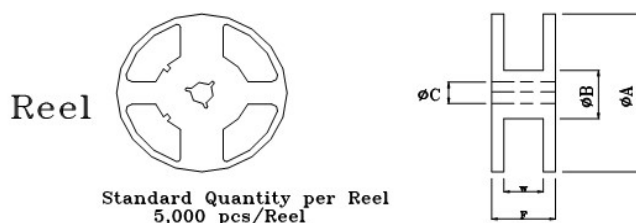
■ 性能 (Performance Specifications)

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	$TCR = (R - R_0) / (t - t_0) R_0 \times 10^6 \text{ (ppm)}$ 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℃)	As Spec
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

内容 Item	测试方法 Test Methods	测试条件 Test Conditions	规格 Specification
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°C至-55±3°C, 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°C or -55±3°C, 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°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。量测试前后阻值变化率。 Put the specimen in a chamber at 40±2°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.	±(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°C, 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°C 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°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。 25°C~65°C,90~100%RH, 2.5H; 65°C 90~100%RH, 3H; 65°C~25°C 80~100%RH, 2.5H, 10 cycles, Measurement at 24±4 hours after test conclusion.	±(2.00% +0.05Ω)

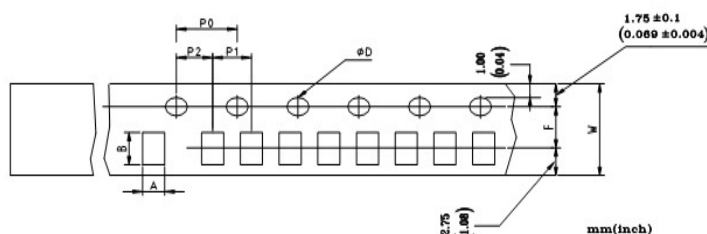
■ 包装规格 (Tapping Specification)

-卷盘尺寸 (Reel dimension)



Type	Size		Unit	A	B	C	F	W
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
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)

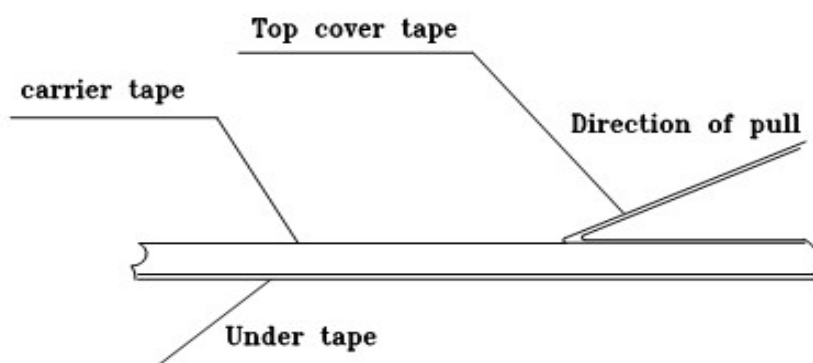


Dimensions	A	B	D	F	P0	P1	P2	W
0603	1.10±0.10	1.90±0.10	1.50± $\begin{smallmatrix} 0.1 \\ 0.0 \end{smallmatrix}$	3.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	8.00±0.20
0805	1.65±0.20	2.40±0.20	1.50± $\begin{smallmatrix} 0.1 \\ 0.0 \end{smallmatrix}$	3.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	8.00±0.20
1206	1.90±0.20	3.50±0.20	1.50± $\begin{smallmatrix} 0.1 \\ 0.0 \end{smallmatrix}$	3.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	8.00±0.20
1210	2.80±0.20	3.50±0.20	1.50± $\begin{smallmatrix} 0.1 \\ 0.0 \end{smallmatrix}$	3.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	8.00±0.20
2010	2.90±0.10	5.30±0.10	1.50± $\begin{smallmatrix} 0.1 \\ 0.0 \end{smallmatrix}$	5.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	12.0±0.10
2512	3.40±0.10	6.60±0.10	1.50± $\begin{smallmatrix} 0.1 \\ 0.0 \end{smallmatrix}$	5.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	12.0±0.10

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

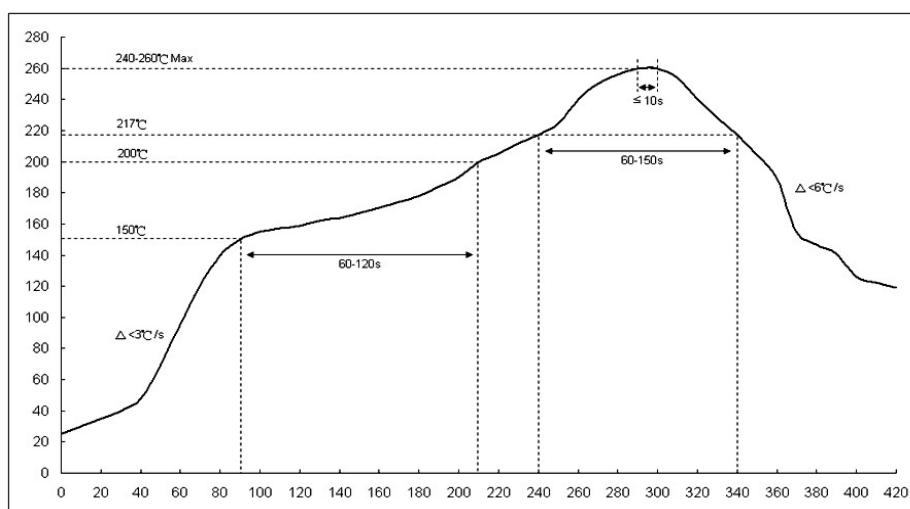
上胶带以 200mm/分钟的速度, 沿 165~180 度角的方向进行剥离, 如下图所示。纸带的剥离力范围为 10g~70g; 载带的剥离力范围为 30~100g。

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)

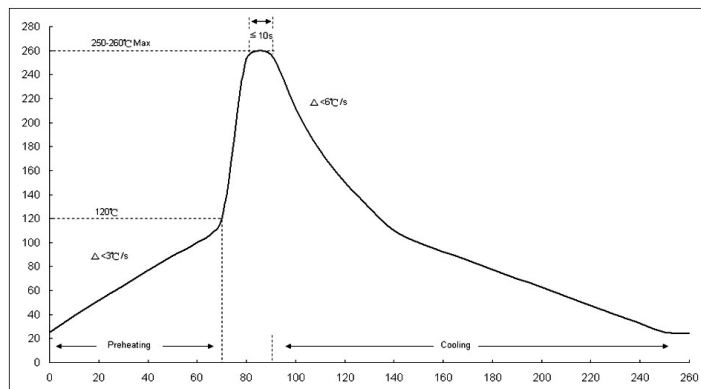


■ 焊接 (soldering)

-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

■ 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, 性能可能会收到影响 (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 $\text{Cl}_2, \text{H}_2\text{S}, \text{NH}_3, \text{SO}_2, \text{and NO}_2$, 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. 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.