

车规高压厚膜晶片电阻 (Automotive High Voltage Thick Film Chip Resistor)



应用(Application)

- Automotive electronics
- Powersupply,Industrialcontrolsystem
- Heating, Ventilating and Air conditioning
- Indoor lighting, Central door locking, Wiper module
- 汽车电子
- 电源、工控系统
- 暖气系统、通风系统、空调
- 室内照明、中央门锁、雨刮器模块

特性(Features)

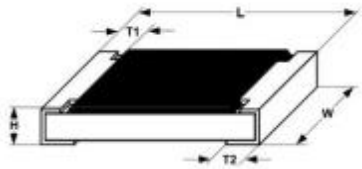
- Small size and light weight
- Reliability, high quality
- Special material and design for high working voltage require
- Comply with AEC-Q200 standar
- 体积小，重量轻
- 可靠性，高质量
- 对高工作电压要求的特殊材质和设计
- 符合 AEC-Q200 标准

料号说明(Parts Number Explanation):

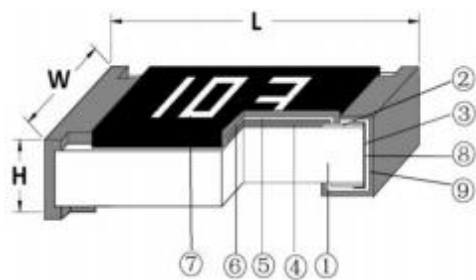
示例 Example: FQV1206J103TS

E 公司名	Q 产品别	V 功能别	1206 型别	J 公差	103 字码	I 包装别	S 端电极	特殊型
FOJAN	R: Resistor C: Capacitor L: Inductor D: Diode A: Audion Q: Auto-motive	C: Normal P: Hi-Power L: Low ohmic 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 2010 2512	B: $\pm 0.1\%$ C: $\pm 0.25\%$ D: $\pm 0.5\%$ F: $\pm 1\%$ J: $\pm 5\%$ P: Jumper	$\pm 5\%$: E24 3-digits+blank 102=1K Ω 1R0=1 Ω $\pm 1\%$ & Below: E24+E96: 4-digits 1001=1K Ω 1R00=1 Ω	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)

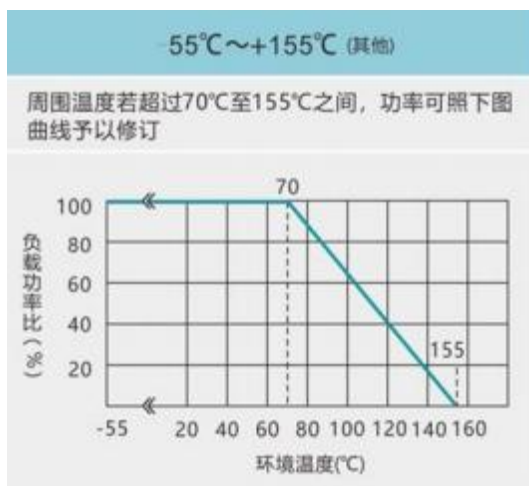
尺寸 dimension					
	单位 (unit) : mm				
型别 (Type)	L	W	H	T1	T2
0603	1.60±0.10	0.80±0.10	0.45±0.10	0.25±0.15	0.25±0.15
0805	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.40±0.20
1206	3.10±0.10	1.60±0.10	0.55±0.10	0.45±0.20	0.45±0.20
1210	3.10±0.10	2.50±0.15	0.55±0.10	0.45±0.15	0.50±0.20
2010	5.00±0.10	2.50±0.15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



■ 阻值范围 (Resistance range) :

型别 Type	阻值范围	Resistance Range
	J (±5%)	F (±1%)
0603	47Ω~22MΩ	47Ω~10MΩ
0805	47Ω~22MΩ	47Ω~10MΩ
1206	47Ω~22MΩ	47Ω~10MΩ
1210	47Ω~22MΩ	47Ω~10MΩ
2010	47Ω~22MΩ	47Ω~10MΩ
2512	47Ω~22MΩ	47Ω~10MΩ

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.

■ 电气特性 (Electrical characteristics)

型别 Type	0603	0805	1206	1210	2010	2512
绝缘耐压 Dielectric Withstanding Voltage	400V	500V	500V	500V	500V	500V
零欧姆阻值 ±5% Resistance Value of Jumper ±5%	<50mΩ	<50mΩ	<50mΩ	<50mΩ	<50mΩ	<50mΩ
零欧姆额定电流 Rated Current of Jumper	1A	2A	2A	2A	2A	2A
零欧姆电阻最大电流 Max Current of Jumper	2A	5A	10A	10A	10A	10A

■ 电性规格 (Standard Electrical Specifications)

型别 Type	额定功率 (Power Rating at 70℃)	最高工作电压 Max. RCWV	最大过负荷电压 Max. Overload Voltage	T.C.R. (PPM/℃)	阻值范围 Resistance Range
0603	1/10W	350V	500V	±200PPM/℃	47Ω~22MΩ
0805	1/8W	400V	800V		
1206	1/4W	500V	1000V		
1210	1/2W	500V	1000V		
2010	3/4W	500V	1000V		
2512	1W	500V	1000V		

■ 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	$TCR = \frac{(R - R_0)}{(t - t_0)} \times 10^6 \text{ (ppm)}$ R0 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℃) t0 室温 (room temperature) t 测试温度 (test temperature 125℃ or -55℃)	47Ω < R ≤ 22MΩ: ±200 PPM/℃

FQV-Series
Automotive High Voltage Thick Film Chip Resistor
FQV 系列车规高压厚膜晶片电阻器规格说明书



内容 Item	测试方法 Test Methods	测试条件 Test Conditions	规格 Specification
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 $245\pm5^{\circ}\text{C}$ ，时间 3 ± 0.5 秒。 Dip the terminal in a flux and then dip into a soldering bath at $245\pm5^{\circ}\text{C}$ for $3\pm0.5\text{sec}$.	> 95%面积上锡 (> 95% coverage)
抗焊锡热 Resist to soldering heat	MIL-STD-202 METHOD 210	沾助焊剂后浸入锡炉，锡炉温度 $260\pm5^{\circ}\text{C}$ ，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 $260\pm5^{\circ}\text{C}$ for $10\pm0.5\text{sec}$. 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 $60\pm5\text{seconds}$. Then measure insulation resistance.	>10G Ω
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 $60\pm5\text{seconds}$.	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	AEC-Q200-005	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 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.	$\pm(1.00\% +0.05\Omega)$
温度循环 Temperature Cycling	JESD22 METHOD JA-104	电阻放入温度循环机中, 温度 $155\pm 2^{\circ}\text{C}$ 至 $-55\pm 3^{\circ}\text{C}$, 共 5 个循环。量测试验前后阻值变化率。 Put specimen in a chamber which temperature can be changed to $155\pm 2^{\circ}\text{C}$ or $-55\pm 3^{\circ}\text{C}$, repeated 5 times. Measure the variation of resistance.	$\pm(2.00\% +0.05\Omega)$
耐湿特性 Humidity	MIL-STD-202 METHOD 103	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.	$\pm(2.00\% +0.05\Omega)$

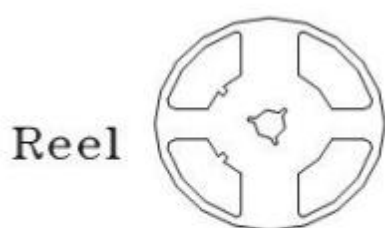
内容 Item	测试方法 Test Methods	测试条件 Test Conditions	规格 Specification
负荷寿命 Load life	MIL-STD-202 METHOD 108	电阻放入恒温箱中, 温度 $70 \pm 2^{\circ}\text{C}$, ON TIME:1.5H, OFF TIME:0.5H, 通电额定电压 $1000^{+24/-0}$ 小时, 量测试验前后阻值变化率. Put the specimen in a chamber at $70 \pm 2^{\circ}\text{C}$ temperature, ON TIME:1.5H, OFF 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 $^{\circ}\text{C}$ ~65 $^{\circ}\text{C}$, 90~100%RH, 2.5 小时; 65 $^{\circ}\text{C}$ 90~100%RH, 3 小时; 65 $^{\circ}\text{C}$ ~25 $^{\circ}\text{C}$, 80~100%RH, 2.5 小时, 10 个循环, 试验结束 24 $\pm$ 4 小时后进行测试. 25 $^{\circ}\text{C}$ ~65 $^{\circ}\text{C}$, 90~100%RH, 2.5H; 65 $^{\circ}\text{C}$ 90~100%RH, 3H; 65 $^{\circ}\text{C}$ ~25 $^{\circ}\text{C}$ 80~100%RH, 2.5H, 10 cycles, Measurement at 24 $\pm$ 4 hours after test conclusion.	$\pm(2.00\% + 0.05\Omega)$
高温储存 High Temperature Exposure(Storage)	MIL-STD-202 METHOD 108	155 $^{\circ}\text{C}$ 下放置 1000h, 不加载功率, 试验结束 24 $\pm$ 4 小时后进行测试. 1000 hrs. @ T=155 $^{\circ}\text{C}$. Unpowered. Measurement at 24 $\pm$ 4 hours after test conclusion	$\pm(1.00\% + 0.05\Omega)$
ESD 试验 ESD test	AEC-Q200-002	加载规定静电电压2次/间隔1秒, 0201/0402规格:0.5KV, 0603规格:1KV, 其它规格2KV. 0201/0402: 0.5KV, 0603: 1.0KV, Other:2KV, 2times/ 1s	$\pm(3.0\% + 0.05\Omega)$

内容 Item	测试方法 Test Methods	测试条件 Test Conditions	规格 Specification
抗硫化试验 Sulfuration test	ASTM-B-809-95	方法一：温度60℃，湿热蒸硫粉试验（加饱和硝酸钾）750hrs 方法二：切削油:硫粉=96.5:3.5，温度60℃，100 hrs; 预处理：前后先经历3次回流焊+100次温冲 Method 1: steam sulfur powder test (with saturated potassium nitrate) at 60℃ with humidity and heat (750hrs) Method 2: cutting oil: sulfur powder =96.5:3.5, temperature 60℃, 100 hrs; Pretreatment: before and after three reflow soldering +100 thermal shock	±(1.0% +0.05Ω)

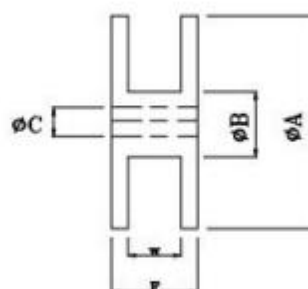
■ 包装规格 (Tapping Specification)

-卷盘尺寸 (Reel dimension)

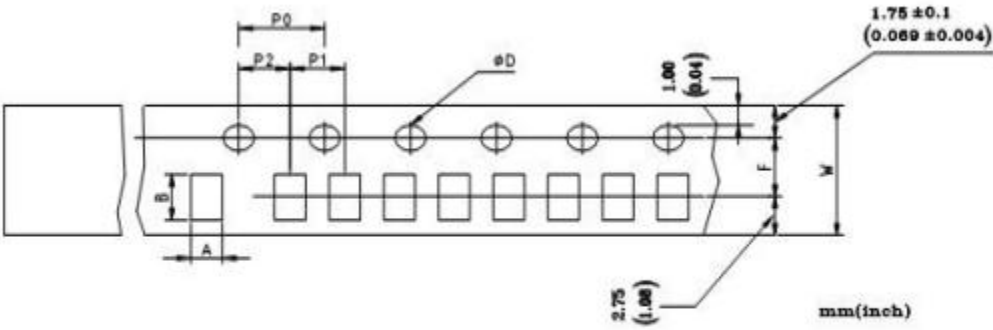
Type	Size		Unit	A	B	C	F	W
0603/0805/1206/1210	7"	5K/Reel	mm	178±2.0	60.0±1.0	13.5±0.5	11.4±0.1	9.00±0.3
0603/0805/1206	10"	10K/Reel	mm	254±2.0	100.0±1.0	13.5±0.5	11.4±0.1	9.00±0.3
0603/0805/1206	13"	20K/Reel	mm	330±2.0	100.0±1.0	13.5±0.5	11.4±0.1	9.00±0.3
2010/2512	7"	4K/Reel	mm	178±2.0	60.0±1.0	13.5±0.5	15.4±1.0	13.0±0.3



Standard Quantity per Reel
5,000 pcs/Reel



-包装尺寸 (packing dimension)



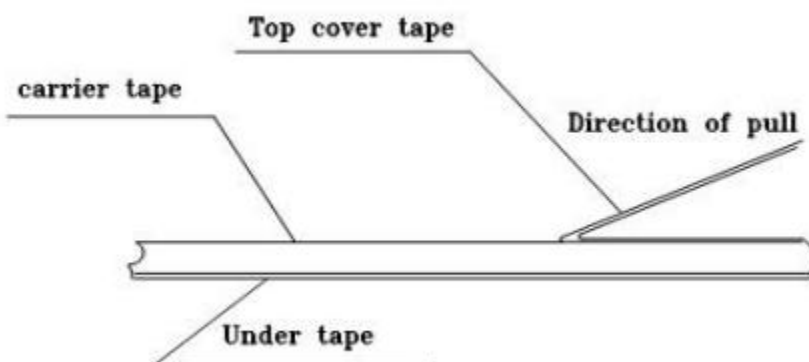
Unit: mm

Dimensions	A	B	D	F	P0	P1	P2	W
0603	1.10±0.10	1.90±0.10	1.50± ^{0.1} _{0.0}	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± ^{0.1} _{0.0}	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± ^{0.1} _{0.0}	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± ^{0.1} _{0.0}	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± ^{0.1} _{0.0}	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± ^{0.1} _{0.0}	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)

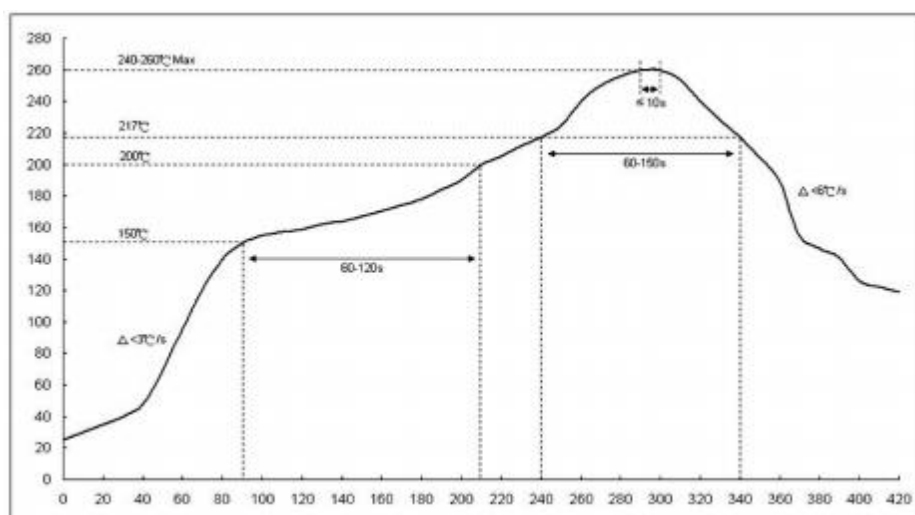
上胶带以 200mm/分钟的速度，沿 165~180 度角的方向进行剥离，如下图所示。纸带的剥离力范围为 10g~70g; 载带的剥离力范围为 30~100g。

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)

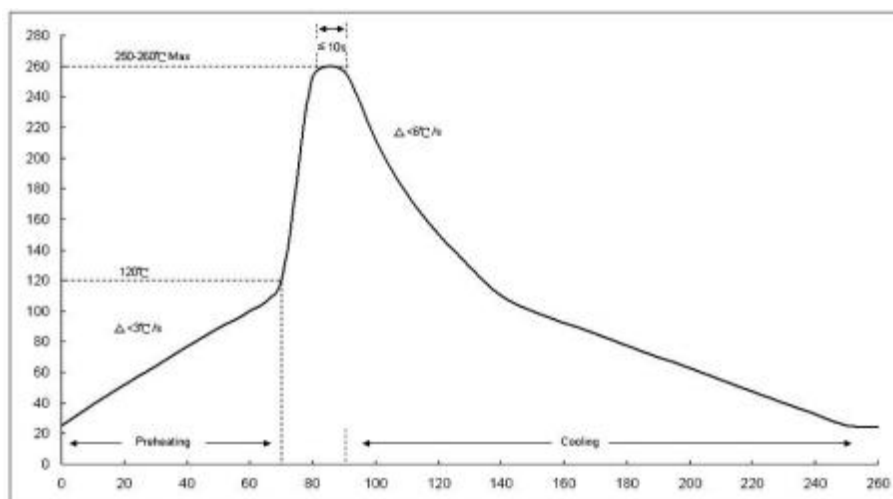


■ 焊接 (soldering)

-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)

烙鐵溫度 $350\pm 10^{\circ}\text{C}$ 3 秒之內，避免烙鐵接觸電阻本體

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 $\text{Cl}_2, \text{H}_2\text{S}, \text{NH}_3, \text{SO}_2$, 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, chemical 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 cleaner even if non cleaning flux.

- 储存 / 搬运条件 (STORAGE / CARRY CONDITIONS)

- | | |
|---|---------------------------------------|
| 6. 储存温度 $25\pm5^{\circ}\text{C}$ | Temperature: $25\pm5^{\circ}\text{C}$ |
| 7. 湿度 30~70%RH | Humidity: 30~70%RH |
| 8. 储存期限: 先进先出, 2 年 | Storage life: 2years FIFO |
| 9. 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. | |