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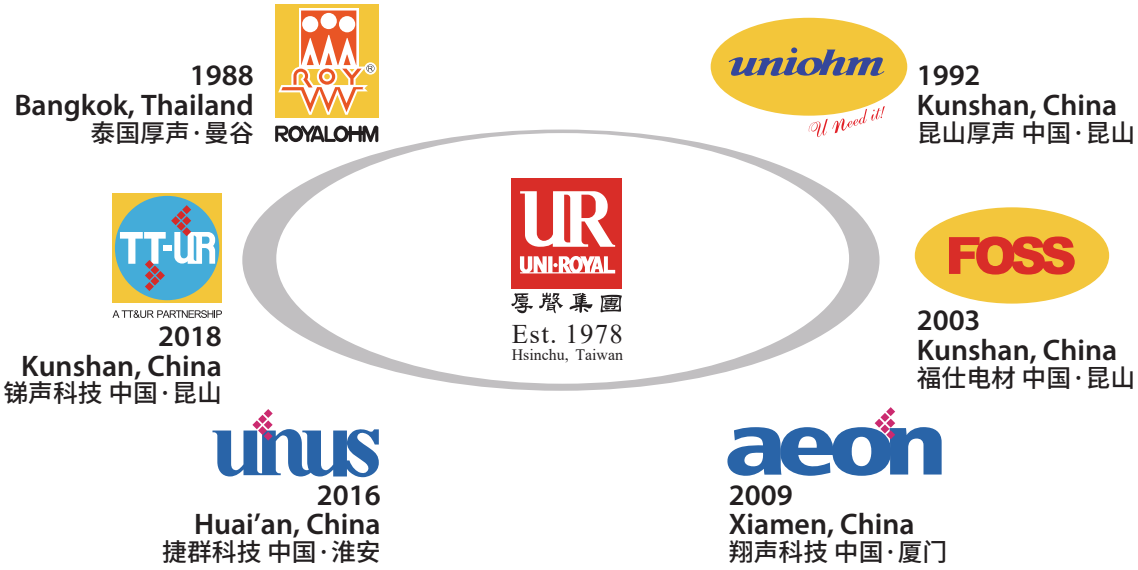
UNI-ROYAL

厚聲集團

2019~2020

厚聲電阻



Our Mission:

Create value for customers, business associates and partners by providing reliable products and quality services.

我们的使命：

通过提供可信赖的产品和服务，为顾客、企业成员和合作伙伴创造价值。

Our Vision:

Become an excellent global supplier of passive components.

Be a respectable corporation to customers, business associates and partners.

我们的愿景：

以产品和服务成为电子制造业卓越的全球供货商。

做客户、企业成员、合作伙伴尊敬的企业。

厚声集团・昆山总部（Kunshan HQ)

UNI-ROYAL Group, founded in Hsinchu, Taiwan in 1978, has become a global leader in CHIP and DIP resistors industry. With more than 40 years of manufacturing experience, UNI-ROYAL has a profound industry insight and innovation leadership for the global electronics industry. UNI-ROYAL has a complete R&D team, manufacturing plants, global sales team and marketing service network located in Taiwan, Kunshan, Shenzhen, Xiamen, and Southeast Asia (Thailand). The group's four well-known brands: **ROYALOHM, UNIOHM, FOSS, AEON**, has become the world's favorite passive components suppliers and preferred partners.

UNI-ROYAL has successively been awarded many international standard system certifications such as QS9000, ISO14001, TL9000 and IATF16949. Products are widely used in microelectronics, mobile terminals, industrial equipment, automotive electronics, the Internet and other emerging civil and military high-tech industries. With the continuous development of the global economy, the iterative update of modern technology, especially the ever-changing application and innovation in the field of electronics, UNI-ROYAL has always provided cutting-edge technology, excellent products and leading solutions to supply a full range of products and services to well-known companies in the global industry.

厚声集团，始创于 1978 年台湾新竹，迄今已经成为全球晶片电阻和插件电阻的行业领导者。凭借逾四十年的制造经验，厚声对全球电子行业拥有深刻的行业洞察与创新领导能力。集团在台湾、昆山、深圳、厦门与东南亚（泰国）拥有完善的电阻研发团队、制造工厂及遍布全球的销售团队和营销服务网络。集团旗下四大著名品牌：**ROYALOHM**、**UNIOHM**、**FOSS**、**AEON**，已成为全球各行业备受青睐的被动元器件重要供货商和首选合作伙伴。

厚声先后获得 QS9000、ISO14001、TL9000、IATF16949 等多项国际标准体系认证。产品广泛应用于微电子、移动终端、工業設備、汽车电子、物联网等新兴民用与军工众多高科技领域。随着全球经济的不断发展、现代化技术的迭代更新，特别是电子领域日新月异的应用革新，厚声始终以前沿的技术、出色的产品和领先的解决方案，向全球行业知名企业提供全方位的产品和服务。

Milestone

1978	Hsinchu, Taiwan	Uniroyal Taiwan
1988	Bangkok, Thailand	Royal Electronic Factory (Thailand) Co., Ltd.
1992	Kunshan, China	Uniroyal Electronics Industry Co., Ltd
2003	Kunshan, China	FOSS Electronics Material
2009	Xiamen, China	Aeon Technology (Xiamen) Corportation
2014	Kunshan, China	Uniroyal Electronics Industry Co., Ltd - New Area
2016	Kunshan, China	Uniroyal Electronics Global Co., Ltd.: KS HQ, Shenzhen Branch, Xiamen Branch

厚声集团沿革

1978	台湾新竹	台湾厚声
1988	泰国曼谷	泰国厚声
1992	中国昆山	昆山厚声
2003	中国昆山	昆山福仕电材
2009	中国厦门	厦门翔声科技
2014	中国昆山	昆山厚声 - 新厂区
2016	中国昆山	厚声国际贸易：昆山总公司、深圳分公司、厦门分公司

泰国一厂 (Thailand 1988)

厦门翔声厂 (Xiamen 2009)

昆山福仕厂 (Kunshan 2003)

泰国二厂 (Thailand 2015)

Resistor

Resistor is a basic component in electronic circuits to control current flow and voltage. They are widely used in electronic circuits and electronic products. Uniroyal Group's products include thin film, thick film chip resistors, DIP type resistors such as DIP array resistors, carbon film, metal film, metal oxide film, metal glaze, wire-wound resistors, cement type resistors, power-type resistors and customized products of various special requirements..

电阻器

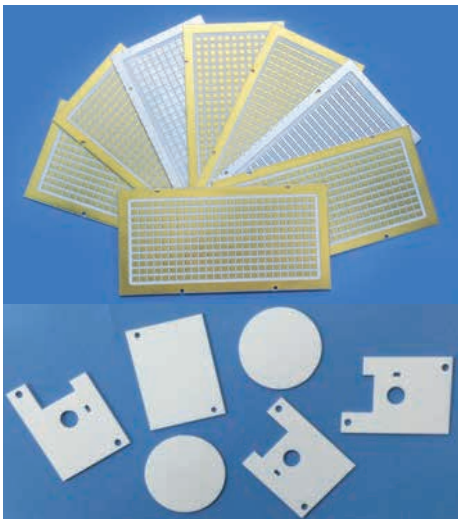
电阻器是电子线路中控制电流及电压的最基本元件 , 被广泛应用于电子电路及电子产品中 , 厚声集团的产品包括薄膜、厚膜晶片电阻，插件电阻如 DIP 排列电阻、碳膜、金属膜、金属氧化膜、玻璃釉、绕线电阻、水泥电阻、功率型电阻以及各种特殊要求的客制化产品。

Electronics Material

Foss Electronics Material Industry Co., Ltd. is one of the world's leading supplier of high quality electronic materials. Its products include all kinds of raw materials, including ceramic rods, capped white ceramic rods, capped sorted filmed-rods, filmed ceramic rods, etc, and various types of ceramic cases and different sizes of iron caps, tin-plated iron caps, etc.

电子材料

福仕电子材料工业有限公司是全球主要的优质电子材料供货商之一。其产品包括各种原材料棒体，包括瓷棒、压帽白棒、组分棒、电阻着膜棒等 ; 各类陶瓷外壳及不同尺寸铁帽、镀锡铁帽等。



Ceramic Substrate

Aeon Technology (Xiamen) provides high-quality precision ceramic substrates that can meet high-end industry applications. Its products are widely used in commercial lighting, indoor lighting, outdoor lighting and decorative lighting applications.

散热基板

翔声科技提供的优质高精密陶瓷散热基板，能满足高端应用，可广泛应用于商业照明、室内照明、户外照明和装饰照明等。

High-Precision Thin Film Chip Resistors-TC

Precision thin film sputtering technology is used in this product. The resistance layer is made of high purity alloy target material. The film structure is compact and rules applied in the inter-ion alignment. It has good temperature stability, low noise coefficient and high reliability. The product can be widely used in medical equipments, precision measuring instruments, communication and precision industrial control equipments.

高精度薄膜晶片电阻器

产品采用精密薄膜溅射技术，电阻层采用高纯度合金靶材溅射而成，膜层结构致密，离子间排列有规则，具有良好的温度稳定性及噪音系数、可靠性高，产品可广泛应用于医疗器材、精密测量仪器、通讯及精密工业控制设备中。

Anti-Sulfurized Thick Film Chip Resistors – NS

NS series resistor is produced by high precision thick film printing technology, use special materials and production processes. The product has excellent corrosion resistance and anti-sulfur performance capability. It is widely used in automotive electronics, instruments and meters, mining machinery, farm equipment and instruments or equipment exposed to sulfur atmosphere.

抗硫化厚膜晶片电阻器

电阻采用高精密厚膜印刷技术制造，特殊的材料和生产工艺生产而成。产品具有优异的耐腐蚀性能和抗硫化能力。广泛应用于汽车电子、仪表、矿山机械、农场设备及含硫环境的仪器中。

Uni-Royal can produce multiple resistors and packaged wafer resistors and lead-type single-row in-line resistors. They can also be designed to meet the customer's requirements for RC or RL network Resistors. They can also be designed with customer-made temperature detection. Functional overcurrent soft protection component.

厚声电阻可生产多颗电阻封装于一体的晶片排阻和引线型单列直插式排阻，也可配合客户需求设计制做 RC 或 RL 网络排阻，还可以配合客户设计制做带温度检测功能的过流软保护元件。

High-Voltage Thick Film Chip Resistors-HV

HV series resistor uses precision thick film printing technology, with unique product design and manufacturing process, so that the product has excellent resistance to high voltage performance, high-voltage resistance is more than twice that of conventional thick film products. It saves cost and help reduce space on the circuit boards; thus effectively reducing the final size of the equipment.

高压厚膜晶片电阻器

电阻采用精密厚膜印刷技术，通过特有的产品设计及制做工艺，使产品具有极好的耐高电压性能，耐高电压特性是常规厚膜产品的 2 倍多，可减小电路板的安装空间及节约产品成本，同时可有效降低设备的最终尺寸。

Metal Foil Current Sensing Chip Resistors - MS

MS series resistor uses photolithography technology allowing circuit patterns to be transferred on to the ceramic substrate. It has excellent temperature stability. The temperature coefficient is 30 PPM/°C or even lower. The product is widely used in current detection circuits and power management applications.

金属带电流检测片式电阻器

产品采用黄光影像转移技术，在陶瓷基板上形成电路，具有极好的温度稳定性，温度系数 30PPM/°C，甚至更低，产品广泛应用于电流检测电路及电源管理电路中。

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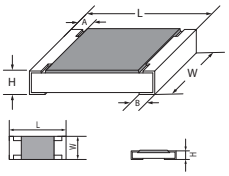
注 : 目录 / 网站參數表仅供一般参考。具体以我司提供的产品规格书为准 , 可根据要求提供所需产品。

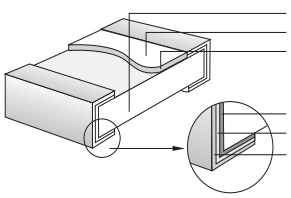
Note: Catalog/website specifications are for general reference only. Detailed Product Specification shall take precedence & is available upon request.

Feature (特性)

- Small size & light weight 短小轻薄
- Reduction of assembly costs and matching with placement machine.
  可降低装置成本及配合机器组装
- Suitable for both wave & re-flow soldering. 适合波峰焊与回流焊
- Applications: Navigator (GPS), Mobile Phone,Telecom, PDA, Setbox, Meter.
  应用于GPS，移动电话，PDA，机顶盒，仪表

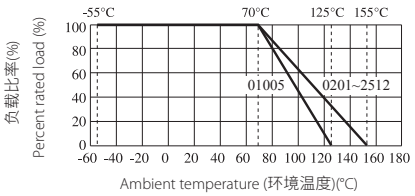
Figures (型状)





1. High purity Alumina substrate (高纯度氧化铝基板)
2. Protective coating (保护层)
3. Resistance element (阻抗元素)
4. Termination (Inner) Ni / Cr [端面(内)镍/铬层]
5. Termination (Between) Ni Barrier [端面(中)镍层]
6. Termination (Outer) Sn [端面(外)锡层(无铅)]

Derating Curve & Specification
降功率曲线及性能



Type 类型	01005	0201	0402	0603	0805	1206	1210	1812	2010	2512
Size 尺寸	0402	0603	1005	1608	2012	3216	3225	4532	5025	6432
Max. Working Voltage 最大工作电压	15V	25V	50V	75V	150V	200V	200V	200V	200V	200V
Max. Overload Voltage 最大过负荷电压	30V	50V	100V	150V	300V	400V	500V	500V	500V	500V
Dielectric withstanding Voltage 绝缘耐压	-	-	100V	300V	500V	500V	500V	500V	500V	500V
Operating Temperature 工作温度范围	-55~+125°C	-55~+155°C	-55~+155°C	-55~+155°C	-55~+155°C	-55~+155°C	-55~+155°C	-55~+155°C	-55~+155°C	-55~+155°C

Type 类型		01005	0201	0402	0603	0805	1206	1210	1812	2010	2512
Dimension 尺寸	L(mm)	0.40±0.02	0.60±0.03	1.00±0.10	1.60±0.10	2.00±0.15	3.10±0.15	3.10±0.10	4.50±0.20	5.00±0.10	6.35±0.10
	W(mm)	0.20±0.02	0.30±0.03	0.50±0.05	0.80±0.10	1.25 +0.15 -0.10	1.55 +0.15 -0.10	2.60±0.20	3.20±0.20	2.50±0.20	3.20±0.20
	H(mm)	0.13±0.02	0.23±0.03	0.35±0.05	0.45±0.10	0.55±0.10	0.55±0.10	0.55±0.10	0.55±0.20	0.55±0.10	0.55±0.10
	A(mm)	0.10±0.03	0.10±0.05	0.20±0.10	0.30±0.20	0.40±0.20	0.45±0.20	0.50±0.25	0.50±0.20	0.60±0.25	0.60±0.25
	B(mm)	0.10±0.03	0.15±0.05	0.25±0.10	0.30±0.20	0.40±0.20	0.45±0.20	0.50±0.20	0.50±0.20	0.50±0.20	0.50±0.20
Resistance Value of Jumper 零欧姆电阻阻值		<50mΩ									
Rated Current of Jumper 零欧姆电阻额定电流		0.5A	0.5A	1A	1A	2A	2A	2A	2A	2A	2A
Max.Overload Current of Jumper 零欧姆电阻最大过负荷电流		1A	1A	2A	2A	5A	10A	10A	10A	10A	10A

Type 类型	01005	0201	0402	0603	0805		1206		1210	1812	2010	2512
Power Rating at 70°C 功率	1/32W	1/20W	1/16W	1/10W	1/8W	1/4W	1/4W	1/3W	1/2W	3/4W	3/4W	1W
Resistance Range of 0.5%(E-96) 0.5% 的阻值范围 (E-96)	-	-	1Ω~10MΩ	1Ω~10MΩ	1Ω~10MΩ	-	1Ω~10MΩ	-	1Ω~10MΩ	1Ω~10MΩ	1Ω~10MΩ	1Ω~10MΩ
Resistance Range of 1%,2%(E-96) 1% ,2% 的阻值范围 (E-96)	10Ω ~ 10MΩ	1Ω~ 10MΩ		0.01Ω~ 10MΩ	0.1Ω≤R <10MΩ	0.01Ω ≤R <0.1 Ω	0.1Ω≤R <10MΩ	0.01Ω≤R <0.1Ω	0.01Ω~10MΩ			
Resistance Range of 5%(E-24) 5% 的阻值范围 (E-24)	1Ω~10MΩ			0.01Ω~ 10MΩ	0.1Ω≤R <10MΩ	0.01Ω ≤R <0.1 Ω	0.1Ω≤R <10MΩ	0.01Ω≤R <0.1Ω	0.01Ω~10MΩ			

Marking on the Resistors Body (电阻本体字码标示)

- For 01005, 0201, 0402 size, no marking on the body due to the small size of the resistor.
  01005, 0201, 0402因电阻本体太小，故本体无标示字码
- ±5% tolerance product: the marking is 3 digits, the first 2 digits are the significant of the resistance and the 3rd digit denotes number of zeros following.
  ±5%公差产品字码是三位数，前二位是阻值的有效数，第三位表示有几个 0
- 0805, 1206, 1210, 2010, 2512 ≤±1%: the marking is 4 digits, the first 3 digits are the significant of the resistance and the 4th digit denotes number of zeros following.
  0805, 1206, 1210, 2010, 2512 ≤±1%公差产品字码有四位数，前三位是阻值的有效数，第四位表示有几个 0
- Standard E-96 series values of 0603 ≤±1%: due to the small size of the resistor's body, 3 digits marking will be used to indicate the accurate resistance value by using the following Multiplier & Resistance Code.
  0603 ≤±1%公差 E-96系列标准阻值，因电阻本体太小，采用三位阻值代码（数字）及下列指数代码（字母）配合来指明标准的阻值。

153 = 15000Ω = 15KΩ

Below 10Ω: 6R8 = 6.8Ω
10Ω 以下标示: 6R8 = 6.8Ω

2372 = 23700Ω = 23.7KΩ

Below 10Ω : 3R24 = 3.24Ω
10Ω 以下标示: 3R24 = 3.24Ω

Multiplier Code (for 0603 ≤±1% marking) [指数码 (0603≤±1% 标示)]

Code 代 码	A	B	C	D	E	F	G	H	X	Y	Z
Power 幂	10^0	10^1	10^2	10^3	10^4	10^5	10^6	10^7	10^{-1}	10^{-2}	10^{-3}

Standard E-96 series Resistance Value code (for 0603≤±1% marking) [E-96系列标准阻值代码 (对0603≤±1%的字码)]

Value 阻值	Code 代码	Value 阻值	Code 代码	Value 阻值	Code 代码	Value 阻值	Code 代码	Value 阻值	Code 代码	Value 阻值	Code 代码
100	01	**147**	17	**215**	33	**316**	49	**464**	65	**681**	81
102	02	**150**	18	**221**	34	**324**	50	**475**	66	**698**	82
105	03	**154**	19	**226**	35	**332**	51	**487**	67	**715**	83
107	04	**158**	20	**232**	36	**340**	52	**499**	68	**732**	84
110	05	**162**	21	**237**	37	**348**	53	**511**	69	**750**	85
113	06	**165**	22	**243**	38	**357**	54	**523**	70	**768**	86
115	07	**169**	23	**249**	39	**365**	55	**536**	71	**787**	87
118	08	**174**	24	**255**	40	**374**	56	**549**	72	**806**	88
121	09	**178**	25	**261**	41	**383**	57	**562**	73	**825**	89
124	10	**182**	26	**267**	42	**392**	58	**576**	74	**845**	90
127	11	**187**	27	**274**	43	**402**	59	**590**	75	**866**	91
130	12	**191**	28	**280**	44	**412**	60	**604**	76	**887**	92
133	13	**196**	29	**287**	45	**422**	61	**619**	77	**909**	93
137	14	**200**	30	**294**	46	**432**	62	**634**	78	**931**	94
140	15	**205**	31	**301**	47	**442**	63	**649**	79	**953**	95
143	16	**210**	32	**309**	48	**453**	64	**665**	80	**976**	96

So the resistance value are marked as the following examples (阻值标示如下):

1.96KΩ= 196 ×10^1 Ω = 29B

12.4Ω= 124 ×10^{-1} = 10X

- Standard E-24 and not belong to E-96 series values (≤±1%) of 0603 size: the marking is the same as 5% tolerance but marking as underline.
  0603≤±1%公差，在标准 E-24 系列中，但不属 E-96 系列的阻值，标示和5%的公差相同，但是在字码下多加一条线

122 = 1200 = 1.2 KΩ

680 = 68Ω

Performance Specifications (性能)

Temperature coefficient	温度系数	01005: 1Ω≤R<10Ω: -200~+600ppm/°C 10Ω≤R<100Ω: ±300ppm/°C 100Ω≤R≤10MΩ: ±200ppm/°C 0201: 1Ω≤R≤10Ω: -100~+350ppm/°C >10Ω: ±200ppm/°C 0402: 1Ω≤R≤10Ω: ±200ppm/°C >10Ω: ±100ppm/°C	0603: 0.01Ω≤R≤0.03Ω:±1500PPM/°C 0.03Ω<R≤0.05Ω:±1000 PPM/°C 0.05Ω<R<1Ω:±800PPM/°C 1Ω≤R≤10Ω: ±200PPM/°C >10Ω:±100PPM/°C 0805, 1206, 1210, 1812, 2010, 2512: 0.01Ω ≤ R ≤0.015Ω: ±1500ppm/°C 0.015Ω < R ≤0.03Ω:±1000ppm/°C 0.03Ω < R <1Ω: ±800ppm/°C 1Ω≤R≤10Ω: ±200ppm/°C >10Ω: ±100ppm/°C
Short-time overload	短时间过负荷	±5%, ± 2%: ±(2.0% + 0.05Ω) ±1%, ± 0.5%: ±(1.0% + 0.05Ω) 01005 ±5% ±1% : ±(2.0% + 0.05Ω)	
Insulation resistance	绝缘电阻	≥ 1,000 MΩ	
Dielectric withstanding voltage	绝缘耐压	No evidence of flashover, mechanical damage, arcing or insulation breakdown 无击穿，飞弧及可见机械性损伤	
Terminal bending	端子弯曲	±(1.0% + 0.05Ω)	
Soldering heat	耐焊接热	±(1.0% + 0.05Ω)	
Solderability	可焊性	Coverage must be over 95%.	
Rapid change of temperature	温度快速变化	±5%, ± 2%: ±(1.0% + 0.05Ω) ±1%, ± 0.5%: ±(0.5% + 0.05Ω) 01005 ±5% ±1% : ±(1.0% + 0.05Ω)	
Humidity (Steady State)	恒定湿热	±5%, ± 2%: ±(3.0% + 0.05Ω) ±1%, ± 0.5%: ±(0.5% + 0.05Ω) 01005 ±5% ±1% (-55°C~125°C): ±(2.0% + 0.05Ω)	
Load life in humidity	湿度寿命	±5%, ± 2%: ±(3.0% + 0.05Ω) ±1%, ± 0.5%: ±(1% + 0.05Ω) 01005: ±(3.0% + 0.05Ω)	
Load life	负载寿命	±5%, ± 2%: ±(3.0% + 0.05Ω) ±1%, ± 0.5%: ±(1% + 0.05Ω) 01005: ±(3.0% + 0.05Ω)	

- The values which are not of standard E-24 series (2% & 5%) and not of E-96 series (1%) could be offered on a case to case basis.
  阻值如不在 E-24 系列 (2% & 5%) 及 E-96 系列 (1%) 可特别提供

Ordering Procedure (Example: 1206 1/4W 5% 1.2 Ω T/R-5000)

订购方式 (例如: 1206 1/4W 5% 1.2 Ω T/R-5000)

1 2 0 6 W 4 J 0 1 2 J T 5 E

Product Type (产品类型):
Fill-in 4 digits with the Chip resistor type as follow (填四位数表示下列各种晶片电阻类型):
0105(01005), 0201, 0402, 0603, 0805, 1206, 1210, 1812, 2010, 2512, 2D02

Wattage (功率):
Fill-in 2 digits with the codes as follow (用下列代码填二位数):
WH = 1/32W WM = 1/20W WG = 1/16W
WA = 1/10W W8 = 1/8W W4 = 1/4W
W2 = 1/2W 07 = 3/4W 1W = 1W

Tolerance (公差):
D = ±0.5%
F = ±1%
G = ±2%
J = ±5%

Resistance Value (阻值):
5% (E-24 series) :
the 1st digit is "0", the 2nd & 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following
5% 产品 (E-24 系列阻值):
第 1 位数是 0，第 2、3 位数表示阻值的有效数，第 4 位表示有几个 0);
≤1%(E-24, E-96 series):
the 1st to 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following
≤1% 产品 (E-24, E-96 系列阻值):
第 1-3 位数表示阻值的有效数，第 4 位数表示有几个 0).

Packing Type (包装类型):
T = T/R (编带 / 卷带)
B = Bulk in Poly bag (散装 / 袋装)
C = Bulk in cassette (散装 / 盒装)

Packing Qty. (包装数量)
1=1,000pcs
2=2,000pcs
3=3,000pcs
4=4,000pcs
5=5,000pcs
C=10,000pcs
D=20,000pcs
E=15,000pcs
H=50,000pcs
J=60,000pcs

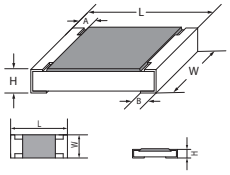
Special Feature (特征):
E = Lead Free (standard)
(无铅标准品)

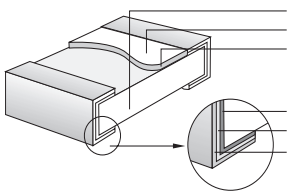
Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明 。

Feature (特性)

- High Resistance 高阻值
- Suitable for reflow & wave soldering
  适合波峰焊与回流焊
- Application AV adapters, LCD back-light camera strobe etc. 适用于AV适配器, LCD背光电路, 照相机闸门等.

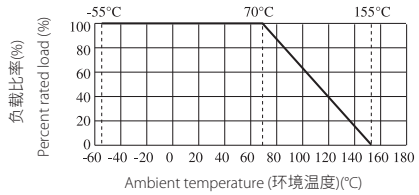
Figures (型状)





1. High purity Alumina substrate (高纯度氧化铝基板)
2. Protective coating (保护层)
3. Resistance element (阻抗元素)
4. Termination (Inner) Ni / Cr [端面(内)镍/铬层]
5. Termination (Between) Ni Barrier [端面(中)镍层]
6. Termination (Outer) Sn [端面(外)锡层(无铅)]

Derating Curve & Specification (降功率曲线及性能)



Type 类型	Max Working Voltage 最大工作电压	Max Overload Voltage 最大过负荷电压	Dielectric Withstanding Voltage 绝缘耐压	Operating Temperature Range 工作温度范围
0603	75V	150V	300V	-55~+155°C
0805	150V	300V	500V	
1206	200V	400V	500V	
1210	200V	500V	500V	

Type 类型	Size 尺寸	Power (功率) (70°C)	L (mm)	W (mm)	H (mm)	A (mm)	B (mm)	Resistance Range (阻值范围) 5% (E24)
0603	1608	1/10W	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	10M~100M
0805	2012	1/8W	2.00±0.15	1.25 +0.15 -0.10	0.55±0.10	0.40±0.20	0.40±0.20	
1206	3216	1/4W	3.10±0.15	1.55 +0.15 -0.10	0.55±0.10	0.45±0.20	0.45±0.20	
1210	3225	1/2W	3.10±0.10	2.60±0.20	0.55±0.10	0.50±0.25	0.50±0.20	

Performance Specification (性能)

Temperature coefficient	温度系数	±200ppm/°C
Short time overload	短时间过负荷	±(2.0%+0.05Ω)
Terminal bending	端子弯曲	±(1.0%+0.05Ω)
Solderability	可焊性	Coverage must be over 95%.
Dielectric withstanding voltage	绝缘耐压	No evidence of flashover, mechanical damage, arcing or insulation breakdown (无击穿 , 飞弧及可见机械性损伤)
Soldering heat	耐焊接热	±(1.0%+0.05Ω)
Rapid change of temperature	温度快速变化	±(1.0%+0.05Ω)
Load Life in humidity	湿度寿命	±(3.0%+0.05Ω)
Load life	负载寿命	±(3.0%+0.05Ω)
Humidity (steady state)	恒定湿热	±(3.0%+0.05Ω)
Insulation resistance	绝缘电阻	≥1,000 MΩ

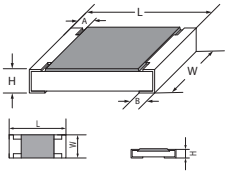
High-Power Thick Film Chip Resistors - HP

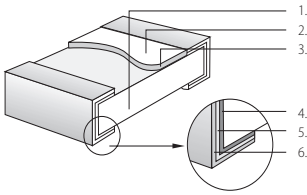
高功率厚膜晶片电阻器 - HP系列

Feature (特性)

- High power in standard size
  标准尺寸，高功率
- Suitable for both wave & re-flow soldering
  适合波峰焊与回流焊
- Application: AV adapters, LCD back-light, camera strobe etc. 适用于AV适配器, LCD背光电路，照相机闸门等

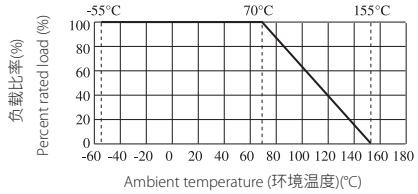
Figures (型状)





1. High purity Alumina substrate (高纯度氧化铝基板)
2. Protective coating (保护层)
3. Resistance element (阻抗元素)
4. Termination (Inner) Ni / Cr [端面(内)镍/铬层]
5. Termination (Between) Ni Barrier [端面(中)镍层]
6. Termination (Outer) Sn [端面(外)锡层(无铅)]

Derating Curve & Specification (降功率曲线及性能)



Type 类型	L(mm)	W(mm)	H(mm)	A(mm)	B(mm)
HP02 (0402)	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10
HP03 (0603)	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20
HP05 (0805)	2.00±0.15	1.25 +0.15 -0.10	0.55±0.10	0.40±0.20	0.40±0.20
HP06 (1206)	3.10±0.15	1.55 +0.15 -0.10	0.55±0.10	0.45±0.20	0.45±0.20
HP07 (1210)	3.10±0.10	2.60±0.20	0.55±0.10	0.50±0.25	0.50±0.20
HP10 (2010)	5.00±0.10	2.50±0.20	0.55±0.10	0.60±0.25	0.50±0.20
HP11 (1812)	4.50±0.20	3.20±0.20	0.55±0.20	0.50±0.20	0.50±0.20
HP12 (2512)	6.35±0.10	3.20±0.20	0.55±0.10	0.60±0.25	0.50±0.20

*Special offered 特别提供 : HP12 B:1.80±0.25mm

Type 类型	Size 尺寸	Power Rating at 70°C 功率	Resistance Range of 1% & 5% 1% & 5% 的阻值范围	Max. Working Voltage 最大工作电压	Max. Overload Voltage 最大过负荷电压	Dielectric Withstanding Voltage 绝缘耐压	Operating Temperature 工作温度范围
HP02	0402 (1005)	1/10W	1Ω~10M	50V	100V	100V	-55°C~155°C
			0Ω		Rmax=10mΩ, Imax=3A		
HP03	0603 (1608)	1/5W	0.1Ω~10M	75V	150V	300V	
			0Ω		Rmax=8mΩ, Imax=5A		
HP05	0805 (2012)	1/3W	10mΩ~10M	150V	300V	500V	
			0Ω		Rmax=5mΩ, Imax=6A		
HP06	1206 (3216)	1/2W	10mΩ~10M	200V	400V	500V	
			0Ω		Rmax=5mΩ, Imax=10A		
HP07	1210 (3225)	3/4W	0.1Ω~10M	200V	500V	500V	
			0Ω		Rmax=4mΩ, Imax=12A		
HP10	2010 (5025)	1W	10mΩ~10M	200V	500V	500V	
			0Ω		Rmax=5mΩ, Imax=12A		
HP11	1812 (4532)	1.25W	0.1Ω~10M	200V	500V	500V	
			0Ω		Rmax=5mΩ, Imax=12A		
HP12	2512 (6432)	2W	10mΩ~10M	250V	500V	500V	
			0Ω		Rmax=5mΩ, Imax=16A		

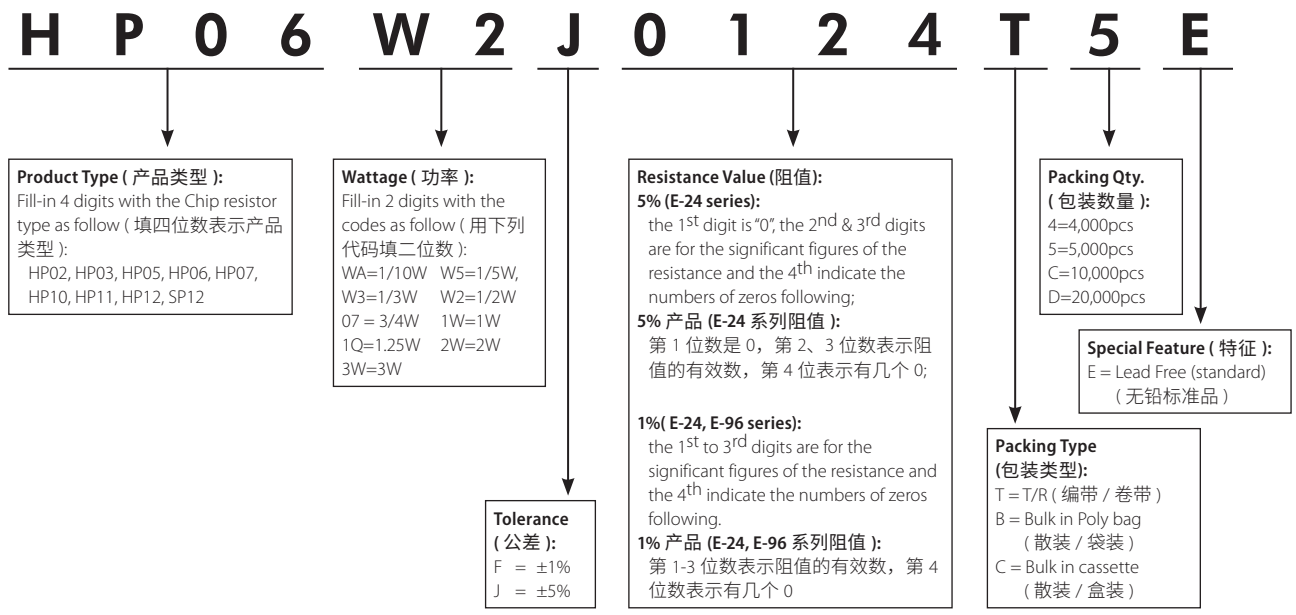
Performance Specifications (性能)

Temperature coefficient	温度系数	HP02: 1Ω≤R ≤ 10Ω: ±400 ppm/°C 10Ω<R ≤100Ω: ±200 ppm/°C 100Ω<R ≤10M : ±100 ppm/°C HP03: 0.1Ω≤R<0.2Ω: ±200ppm/°C 0.2Ω≤R≤10M: ±100ppm/°C HP05: 10mΩ≤R≤15mΩ: ±800ppm/°C 15mΩ<R≤25mΩ: ±600ppm/°C 25mΩ<R≤50mΩ: ±400ppm/°C 50mΩ<R<0.1Ω: ±200ppm/°C 0.1Ω≤R≤10M: ±100ppm/°C HP06: 10mΩ≤R<15mΩ: ±700 ppm/°C 15mΩ≤R<30mΩ: ±400 ppm/°C 30mΩ≤R<50mΩ: ±300 ppm/°C 50mΩ≤R<0.1Ω: ±150 ppm/°C 0.1Ω≤R≤10M:±100 ppm/°C HP07, HP11: ±100 ppm/°C HP10: 10mΩ≤R<15mΩ: 0~+800 ppm/°C 15mΩ≤R<50mΩ: 0~+600 ppm/°C 50mΩ≤R<10M: ±100 ppm/°C HP12: 10mΩ≤R<20mΩ: 0~+800ppm/°C 20mΩ≤R≤50mΩ: 0~+400ppm/°C 50mΩ<R≤10M: ±75ppm/°C

Short-time overload	短时间过负荷	±5%: ±(2.0% + 0.1Ω) ±1%: ±(1.0% + 0.1Ω)
Dielectric withstanding voltage	绝缘耐压	No Evidence of flashover, mechanical damage,arcing or insulation breakdown 无击穿，飞弧及可见机械性损伤
Terminal bending	端子弯曲	±(1.0% + 0.05Ω)
Soldering heat	耐焊接热	±(1.0% + 0.05Ω)
Solderability	可焊性	Coverage must be over 95%.
Rapid change of temperature	温度快速变化	±5%: ±(1.0% + 0.05Ω) ±1%: ±(0.5% + 0.05Ω)
Humidity (Steady state)	恒定湿热	±5%: ±(3.0% + 0.1Ω) ±1%: ±(0.5% + 0.1Ω)
Load life in humidity	湿度寿命	±5%: ±(3.0% + 0.1Ω) ±1%: ±(1.0% + 0.1Ω)
Load life	负载寿命	±5%: ±(3.0% + 0.1Ω) ±1%: ±(1.0% + 0.1Ω)

Ordering Procedure (Example: High Power HP06 1/2W 5% 120KΩ T/R-5000)

订购方式 (例如: 高功率 HP06 1/2W 5% 120KΩ T/R-5000)



Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明 。

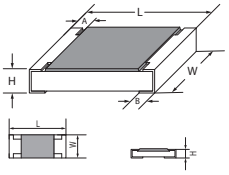
Ultra High Power Thick Film Chip Resistors - SP

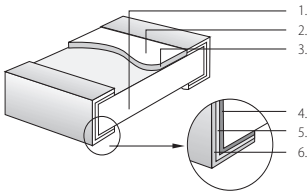
超高功率厚膜晶片电阻器 - SP系列

Feature (特性)

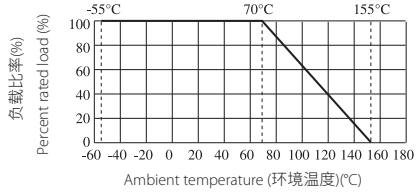
- High power rating up to 6 watts
  高功率可达6W
- Suitable for both wave & re-flow soldering
  适合波峰焊与回流焊
- Application LED lamps, Intelligent home appliances, Medical equipment, Kinds of industrial control devices & Industrial supplies
  适用于LED 灯具、智能家电产品、医疗设备、各种工业控制装置及工业电源等

Figures (型状)





Derating Curve & Specification (降功率曲线及性能)



Type 类型	L(mm)	W(mm)	H(mm)	A(mm)	B(mm)
SP10 (2010)	5.00 ± 0.10	2.50 ± 0.15	1.10 ± 0.10	0.60 ± 0.25	0.50 ± 0.20
SP12 (2512)	6.35 ± 0.10	3.20 ± 0.15	1.10 ± 0.10	0.60 ± 0.25	1.80 ± 0.20
SP17 (2817)	7.10 ± 0.20	4.20 ± 0.20	1.10 ± 0.10	0.60 ± 0.20	1.80 ± 0.20
SP20 (4320)	11.00 ± 0.30	5.00 ± 0.25	1.10 ± 0.10	0.80 ± 0.20	2.40 ± 0.20
SP27 (4527)	11.60 ± 0.30	6.85± 0.25	1.10 ± 0.10	1.00 ± 0.20	2.50 ± 0.20

Type 类型	Size 尺寸	Power Rating at 70°C 功率	Resistance Range of 1% & 5% 1% & 5% 的阻值范围	Max. Working Voltage 最大工作电压	Max. Overload Voltage 最大过负荷电压	Dielectric Withstanding Voltage 绝缘耐压	Operating Temperature 工作温度范围
SP10	2010 (5025)	2W	1Ω ~ 10MΩ	200V	500V	500V	-55℃~155℃
SP12	2512 (6432)	3W		250V	500V	500V	
SP17	2817 (7142)	4W		250V	500V	500V	
SP20	4320 (1150)	5W		300V	600V	600V	
SP27	4527 (1267)	6W		300V	600V	600V	

Performance Specifications (性能)

Test Item 试验项目	Test Methods 试验方法	Evaluation Criteria 判定标准
Temperature coefficient 温度系数	Measure between -55℃ ~+155℃ 测定范围：-55℃ ~+155℃	1Ω~10Ω ≤± 200PPM/℃ 10.1Ω~10MΩ ≤± 100PPM/℃
Short-time overload 短时间过负荷	2.5x Rated voltage or Max. Overload Voltage whichever is lower for 5 seconds, then check the resistance. 2.5 倍额定电压或最大过负荷电压 (取其低者), 持续 5 秒钟 , 然后测阻值。	± 5% (2.0% + 0.1Ω) ± 1% (1.0% + 0.1Ω)
Terminal Bending 端子弯曲	Bending Distance 3mm, Duration: 60s±5s, then check the resistance. 弯曲距离：3mm，保持时间：60s±5s，然后测试阻值。	± (1.0% + 0.05Ω)
Solderability 可焊性	Temperature of solder: 245±3°C; Dwell time in solder: 2~3seconds. 锡炉温度 : 245±3°C ; 浸入时间 : 2~3 秒。	Coverage must be over 95%. 覆盖率 ≥95%
Soldering heat 耐焊接热	Permanent resister change when leads immersed to a point 2.0~2.5mm from the body in 260±5℃ solder 10±1 seconds. 锡炉温度 260±5°C，侵入深度：离本体导线根部约 2.0~2.5mm 处，浸入时间：2~3 秒。	± (1.0%+0.05Ω)
Dielectric withstanding voltage 绝缘耐压	Resistor shall be clamped in the trough of 90° metallic V-block and shall be tested at AC potential respectively specified in the given list of each product type for 60~70s. 电阻固定在 90° 的 V 型槽中 , 根据不同产品规定交流电压 , 持续 60~70 秒 .	No evidence of flashover, mechanical damage, arcing or insulation breakdown 无击穿 , 飞弧及可见机械性损伤
Rapid change of temperature 温度快速变化	30 min at -55 ℃ and 30 min at 155 ℃; 100 cycles -55 ℃ 温度放置 30min, 155 ℃ 温度放置 30min, 100 个循环 ; **IEC 60115-1 4.19**	± 5% (1.0% + 0.1Ω). ± 1% (0.5% + 0.1Ω).
Load life 负载寿命	70°C，at RCWV or Max.Working Voltage whichever less,1,000 hours(1.5 hours "ON", 0.5 hours"OFF"), Measurement at 24±4 hours after test conclusion. 70°C，额定工作电压或最大工作电压 (取其低者)，持续时间：1,000h(1.5h" 通 "，0.5h" 断 ")，试验结束 24h 后进行测试 . MIL-STD-202 Method 108	± 5% (3.0% + 0.1Ω). ± 1% (1.0% + 0.1Ω).
Humidity (Steady State) 恒定湿热	Temporary resistance change after 240 hours exposure in a humidity test chamber controlled at 40±2°C and 90~95% RH. 在 40±2°C 和 90~95% RH 相对湿度条件下，存放 240h 后阻值变化率	± 5% (3.0% + 0.1Ω) . ± 1% (0.5% + 0.1Ω)
Load life in humidity 湿度寿命	Resistance change after 1000 hours (1.5hours"ON"，0.5hours"OFF") at RCWV or Max.Working Voltage whichever less in a humidity test chamber controlled at 40±2°C and 90~95% RH. 持续时间：1000h (1.5h" 通 "，0.5h" 断 ")；试验温度：40±2°C；相对湿度：90~95% RH；试验电压：额定工作电压或最大工作电压 (取其低者)。	± 5% (3.0% + 0.1Ω) . ± 1% (1.0% + 0.1Ω)

Ordering Procedure (Example: SP12 3W (2512) ±1% 10Ω T/R-2,000)

订购方式 (例如: SP12 3W (2512) ±1% 10Ω T/R-2,000)

S P 1 2 3 W F 1 0 0 J T 2 E

Product Type (产品类型):
Fill-in 4 digits with the Chip resistor type as follow (填四位数表示产品类型):
SP06: 1206 SP10: 2010
SP12: 2512 SP17: 2817

Wattage (功率):
Fill-in 2 digits with the codes as follow (用下列代码填二位数):
1W = 1W 2W = 2W 3W = 3W
4W = 4W 5W = 5W 6W = 6W

Tolerance (公差):
F = ±1%
J = ±5%

Resistance Value (阻值):
5% (E-24 series):
the 1st digit is "0", the 2nd & 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following;
5% 产品 (E-24 系列阻值):
第 1 位数是 0，第 2、3 位数表示阻值的有效数，第 4 位表示有几个 0;

1%(E-24, E-96 series):
the 1st to 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following.
1% 产品 (E-24, E-96 系列阻值):
第 1-3 位数表示阻值的有效数，第 4 位数表示有几个 0

Packing Type (包装类型):
T = T/R (编带 / 卷带)

Packing Qty. (包装数量):
1=1,000pcs
2=2,000pcs

Special Feature (特征):
E = Lead Free (standard)
(无铅标准品)
RoHS compliant

Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明 。

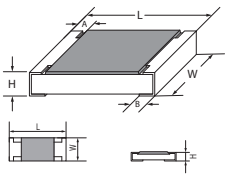
High-Voltage Thick Film Chip Resistors - HV

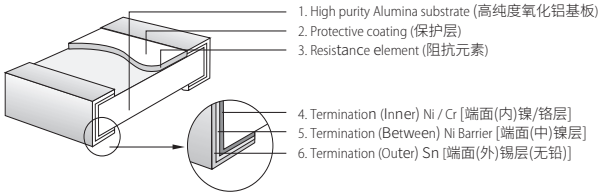
高压厚膜晶片电阻器 - HV系列

Feature (特性)

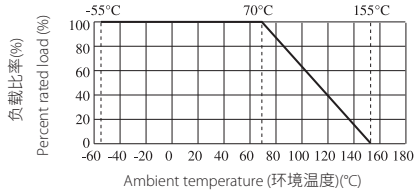
- Superiority in Max. Working Voltage performance than general thick film Chip Resistors. 在最大工作电压上优于普通厚膜晶片电阻
- Suitable for both wave & re-flow soldering 适合波峰焊及回流焊
- Application: AV adapter, LCD Backlight, Flash Light of camera 适用于AV适配器、LCD背光电路、照相机的闪光灯等

Figures (型状)





Derating Curve & Specification (降功率曲线及性能)



Type 类型	Max. Working Voltage 最大工作电压	Max. Overload Voltage 最大过负荷电压	Dielectric Withstanding Voltage 绝缘耐压	Operating Temperature 工作温度范围
HV03	200V	400V	300V	-55°C~155°C
HV05	400V	800V	500V	
HV06	500V	1000V	500V	
HV07	800V	1500V	500V	
HV10	2000V	3000V	500V	
HV12	3000V	4000V	500V	

Type 类型	Size 尺寸	Power Rating 功率 at 70°C	L(mm)	W(mm)	H(mm)	A(mm)	B(mm)	Resistance Range 阻值范围 1% & 5%
HV03	0603 (1608)	1/10W	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30± 0.20	36KΩ~10MΩ
HV05	0805 (2012)	1/8W	2.00±0.15	1.25 $^{+0.15}_{-0.10}$	0.55±0.10	0.40±0.20	0.40± 0.20	100KΩ~10MΩ
HV06	1206 (3216)	1/4W	3.10±0.15	1.55 $^{+0.15}_{-0.10}$	0.55±0.10	0.45±0.20	0.45±0.20	100KΩ~10MΩ
HV07	1210 (3225)	1/2W	3.10±0.10	2.60±0.20	0.55±0.10	0.50±0.25	0.50±0.20	50KΩ~10MΩ
HV10	2010 (5025)	3/4W	5.00±0.10	2.50±0.20	0.55±0.10	0.60±0.25	0.50±0.20	50KΩ~10MΩ
HV12	2512 (6432)	1W	6.35±0.10	3.20±0.20	0.55±0.10	0.60±0.25	0.50±0.20	39KΩ~10MΩ

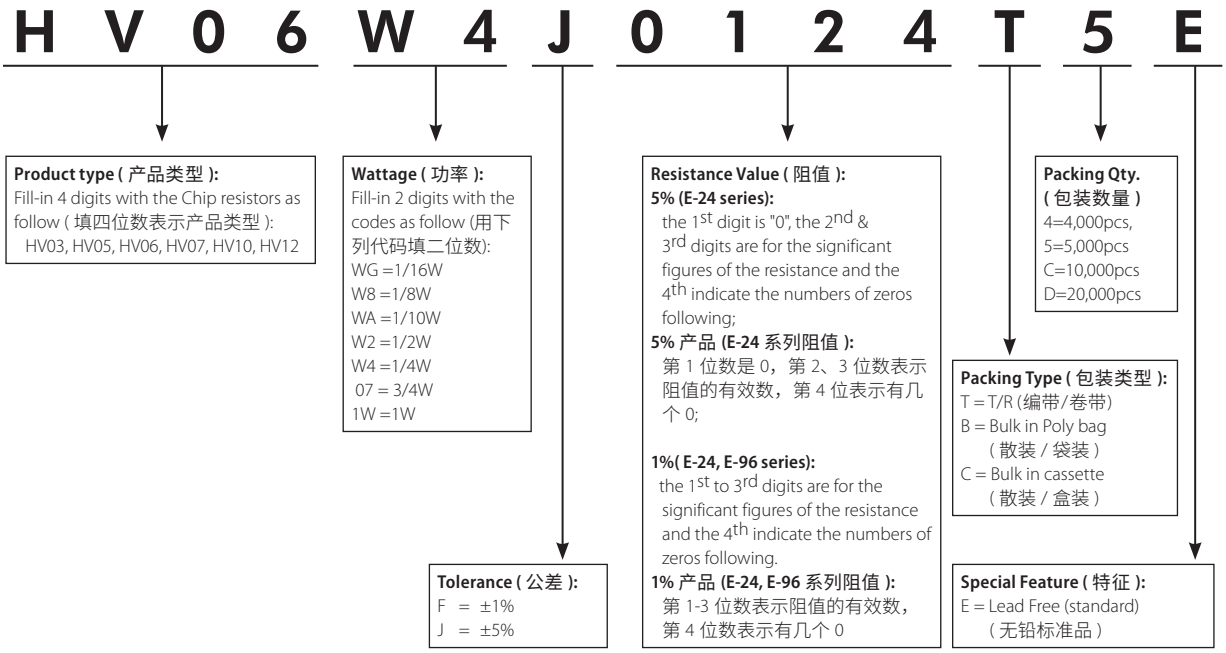
The NV series of Anti-sulfuration products are available in particular. NV系列抗硫化產品可特別提供.

Performance Specification (性能)

Temperature coefficient	温度系数	±100PPM/°C
Short-time overload	短时间过负荷	±(2.0%+0.1Ω)
Terminal bending	端子弯曲	±(1.0%+0.05Ω)
Solderability	可焊性	Coverage must be over 95%.
Rapid change of temperature	温度快速变化	5% : ±(1.0%+0.05Ω) 1%: ±(0.5%+0.05Ω)
Humidity (Steady State)	恒定湿热	±(3.0%+0.1Ω)
Load life in humidity	湿度寿命	±(3.0%+0.1Ω)
Load life	负载寿命	±(3.0%+0.1Ω)
Insulation resistance	绝缘电阻	≥1,000MΩ
Dielectric withstanding voltage	绝缘耐压	No evidence of flashover, mechanical damage, arcing or insulation breakdown 无击穿，飞弧及可见机械性损伤
Soldering heat	耐焊接热	±(1.0% + 0.05Ω)

Ordering Procedure (Example: High Voltage HV06 1/4W 5% 120KΩ T/R-5000)

订购方式 (例如: 高压 HV06 1/4W 5% 120KΩ T/R-5000)



Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明 。

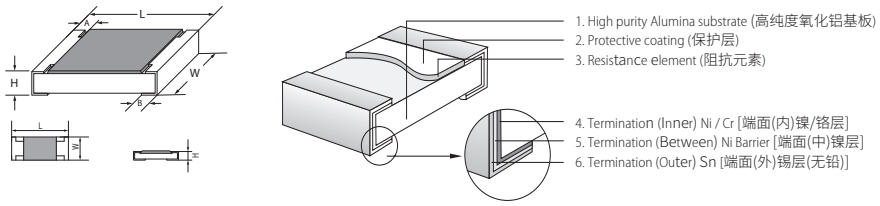
Anti-Surge Thick Film Chip Resistors - AS

抗浪涌厚膜晶片电阻器 - AS系列

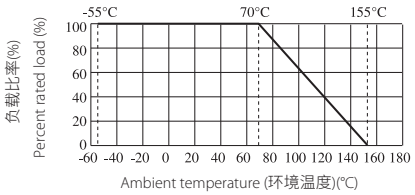
Feature (特性)

- Superior Anti-Surge Voltage performance. 优越的抗浪涌电压特性
- Suitable for both wave & re-flow soldering 适合波峰焊与回流焊
- Application AV adapters, LCD back-light camera strobe etc. 适用于AV适配器、LCD背光电路、照相机的闸门等

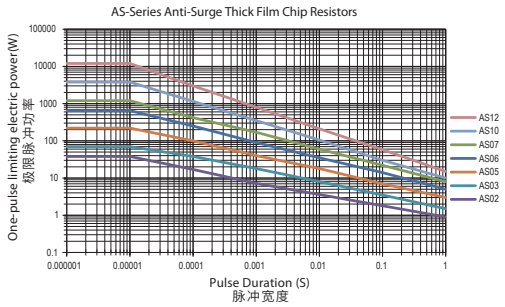
Figures (型状)



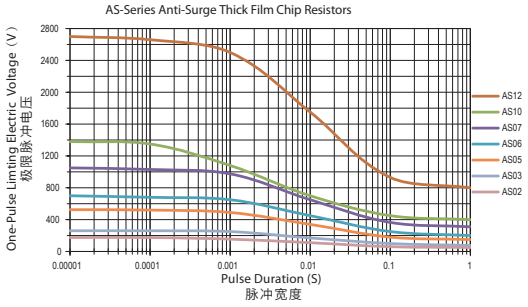
Derating Curve (降功率曲线)



Curve of Pulse Duration (脉冲曲线)



Pulse Voltage Limit (电压曲线)



Specification (规格)

Type 类型	Size 尺寸	Max. Working Voltage 最大工作电压	Max. Overload Voltage 最大过负荷电压	Dielectric Withstanding Voltage 绝缘耐压	Operating Temperature 工作温度范围
AS02	0402 (1005)	50V	100V	100V	-55~+155°C
AS03	0603 (1608)	75V	150V	300V	
AS05	0805 (2012)	150V	300V	500V	
AS06	1206 (3216)	200V	400V	500V	
AS07	1210 (3225)	200V	500V	500V	
AS10	2010 (5025)	400V	800V	500V	
AS12	2512 (6432)	500V	1000V	500V	

Type 类型	Power (功率) (70°C)	L (mm)	W (mm)	H (mm)	A (mm)	B (mm)	Resistance Range 阻值范围	Tolerance 公 差
AS02	1/8W	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10	1Ω~10M	±5% ±10% ±20%
AS03	1/4W	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20		
AS05	1/2W	2.00±0.15	1.25 $^{+0.15}_{-0.10}$	0.55±0.10	0.40±0.20	0.40±0.20		
AS06	0.6W	3.10±0.15	1.55 $^{+0.15}_{-0.10}$	0.55±0.10	0.45±0.20	0.45±0.20		
AS07	3/4W	3.10±0.10	2.60±0.20	0.55±0.10	0.50±0.25	0.50±0.20		
AS10	1.5W	5.00±0.10	2.50±0.20	0.55±0.10	0.60±0.25	0.50±0.20		
AS12	2W	6.35±0.10	3.20±0.20	0.55±0.10	0.60±0.25	0.50±0.20		

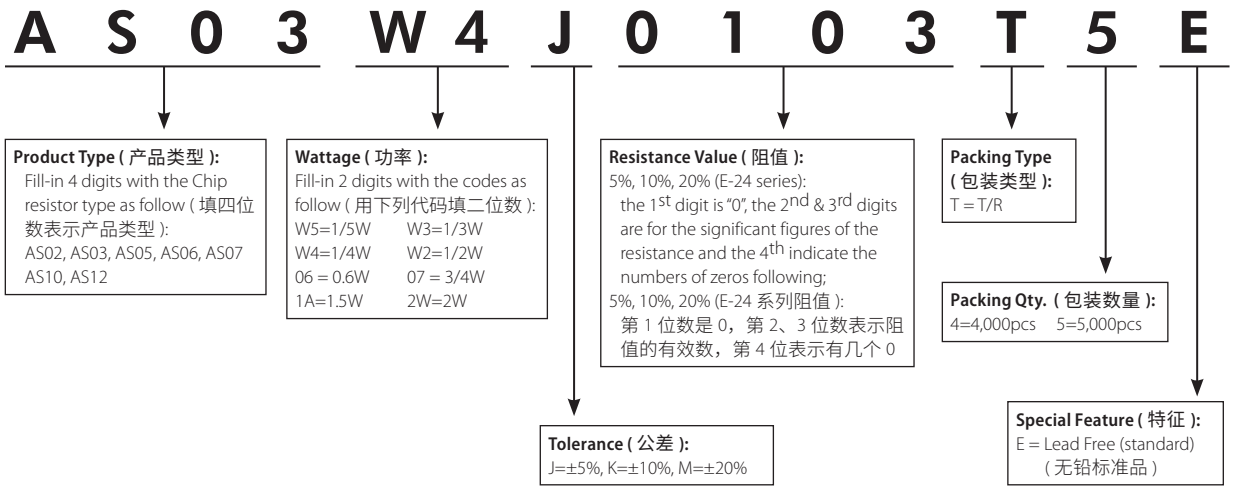
*Special offered 特别提供 : AS12 B:1.80±0.25mm

Performance Specifications (性能)

Temperature coefficient	温度系数	1Ω≤R≤10Ω: ±400ppm/℃ 10Ω<R≤10M: ±100ppm/℃
Short-time overload	短时间过负荷	±(1.0%+0.1Ω)
Terminal bending	端子弯曲	±(1.0%+0.05Ω)
Solderability	可焊性	Coverage must be over 95%.
Dielectric withstanding voltage	绝缘耐压	No evidence of flashover, mechanical damage, arcing or insulation breakdown 无击穿，飞弧及可见机械性损伤
Soldering heat	耐焊接热	±(1.0%+0.05Ω)
Rapid change of temperature	温度快速变化	±(1.0%+0.05Ω)
Load Life in humidity	湿度寿命	±(3.0%+0.1Ω)
Load life	负载寿命	±(3.0%+0.1Ω)
Humidity (Steady State)	恒定湿热	±(3.0%+0.1Ω)
Single pulse	单脉冲	±(1.0%+0.1Ω)

Ordering Procedure (Example: Anti-surge AS03 1/4W 5% 10KΩ T/R-5000)

订购方式 (例如: 抗浪涌 AS03 1/4W 5% 10KΩ T/R-5000)



Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明。

High-Precision Anti-Surge Thick Film Chip Resistors - PS

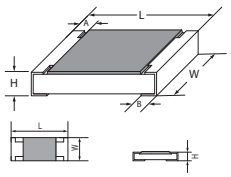
高精度抗浪涌厚膜晶片电阻器 - PS系列

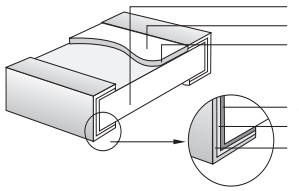
ROYALOHM
www.royalohm.com

Feature (特性)

- High-Precision, high-power, anti-pulse 高精度、高功率、抗脉冲
- Suitable for reflow & wave soldering 适合波峰焊与回流焊
- Application monitors, power supplies, camcorder, laptop computer
  适用于显示器、电源、手提电脑

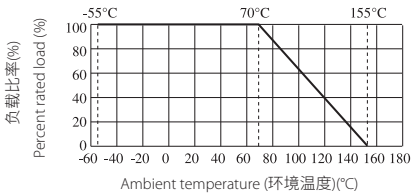
Figures (型状)



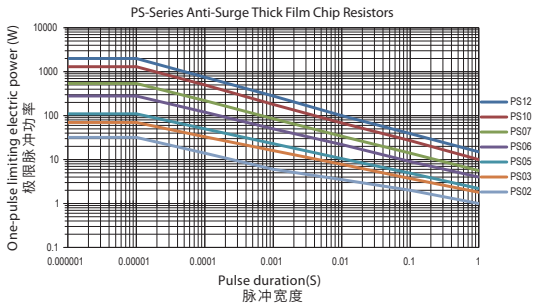


1. High purity Alumina substrate (高纯度氧化铝基板)
2. Protective coating (保护层)
3. Resistance element (阻抗元素)
4. Termination (Inner) Ni / Cr [端面(内)镍/铬层]
5. Termination (Between) Ni Barrier [端面(中)镍层]
6. Termination (Outer) Sn [端面(外)锡层(无铅)]

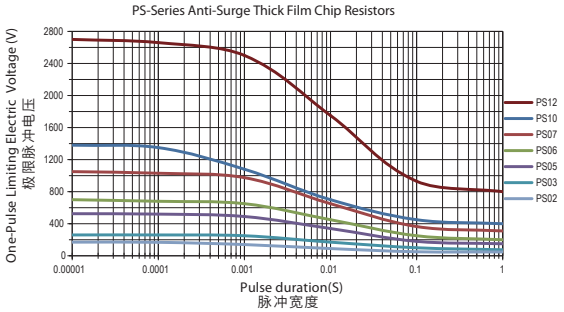
Derating Curve (降功率曲线)



Curve of Pulse Duration (脉冲曲线)



Pulse Voltage Limit (电压曲线)



Specification (性能)

Type 类型	Size 尺寸	Max working voltage 最大工作电压	Max Overload Voltage 最大过负荷电压	Dielectric Withstanding Voltage 绝缘耐压	Operating Temperature 工作温度范围
PS02	0402 (1005)	50V	100V	100V	-55~+155℃
PS03	0603 (1608)	50V	100V	300V	
PS05	0805 (2012)	150V	300V	500V	
PS06	1206 (3216)	200V	400V	500V	
PS07	1210 (3225)	200V	500V	500V	
PS10	2010 (5025)	400V	800V	500V	
PS12	2512 (6432)	500V	1000V	500V	

Type 类型	Power 功率 (70°C)	L (mm)	W (mm)	H (mm)	A (mm)	B (mm)	Resistance Range 阻值范围 1%(E96), 5%(E24)
PS02	1/8W	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10	1Ω~10M
PS03	1/4W	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	
PS05	1/3W	2.00±0.15	1.25 $^{+0.15}_{-0.10}$	0.55±0.10	0.40±0.20	0.40±0.20	
PS06	1/2W	3.10±0.15	1.55 $^{+0.15}_{-0.10}$	0.55±0.10	0.45±0.20	0.45±0.20	0.1Ω~10M
PS07	3/4W	3.10±0.10	2.60±0.20	0.55±0.10	0.55±0.25	0.50±0.20	
PS10	1.25W	5.00±0.10	2.50±0.20	0.55±0.10	0.60±0.25	0.50±0.20	1Ω~10M
PS12	2W	6.35±0.10	3.20±0.20	0.55±0.10	0.60±0.25	0.50±0.20	0.1Ω~10M

*Special offered 特别提供 : PS12 B:1.80±0.25mm

Performance Specification (性能)

Temperature coefficient	温度系数	PS02: 1Ω~10Ω: ±400PPM/°C 11Ω~100Ω: ±200PPM/°C >100Ω: ±100PPM/°C PS03, PS05, PS06, PS07, PS10, PS12: ±100ppm/°C
Short-time overload	短时间过负荷	±1%:±(1.0%+0.1Ω) ±5%:±(2.0%+0.1Ω)
Terminal bending	端子弯曲	±(1.0%+0.05Ω)
Solderability	可焊性	Coverage must be over 95%.
Soldering heat	耐焊接热	±(1.0% + 0.05Ω)
Load life in humidity	湿度寿命	±1%:±(1.0%+0.1Ω) ±5%:±(3.0%+0.1Ω)
Dielectric withstanding voltage	绝缘耐压	No evidence of flashover, mechanical damage, arcing or insulation breakdown 无击穿，飞弧及可见机械性损伤
Rapid change of temperature	温度快速变化	±1%:±(0.5%+0.1Ω) ±5%:±(3.0%+0.1Ω)
Load life	负载寿命	±1%:±(1.0%+0.1Ω) ±5%:±(3.0%+0.1Ω)
Single pulse	单脉冲	±(1.0%+0.1Ω)

Ordering Procedure (Example: PS05 1/3W 5% 120KΩ T/R-5000)

订购方式 (例如: PS05 1/3W 5% 120KΩ T/R-5000)

P S 0 5 W 3 J 0 1 2 4 T 5 E

Product Type (产品类型):
Fill-in 4 digits with the Chip resistor type as follow (填四位数表示产品类型) :
PS02, PS03, PS05, PS06, PS07, PS10, PS12

Wattage (功率):
Fill-in 2 digits with the codes as follow (用下列代码填二位数):
W2=1/2W
W3=1/3W
W4=1/4W
W5=1/5W
W8=1/8W
07=3/4W
1Q=1.25W
2W=2W

Tolerance (公差):
F = ±1%
J = ±5%

Resistance Value (阻值):
5% (E-24 series) :
the 1st digit is "0", the 2nd & 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following
5% 产品 (E-24 系列阻值):
第 1 位数是 0，第 2、3 位数表示阻值的有效数，第 4 位表示有几个 0);
≤1%(E-96 series):
the 1st to 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following
1% 产品 (E96 系列阻值):
第 1-3 位数表示阻值的有效数，第 4 位数表示有几个 0).

Packing Qty. (包装数量)
4=4,000pcs
5=5,000pcs
c=10,000pcs

Special Feature (特征):
E = Lead Free (standard)
(无铅标准品)

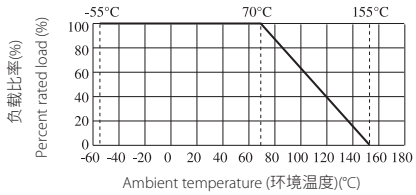
Packing Type (包装类型):
T = T/R (编带 / 卷带)

Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明 。

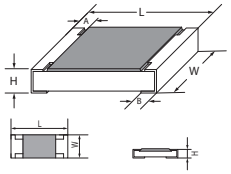
Feature (特性)

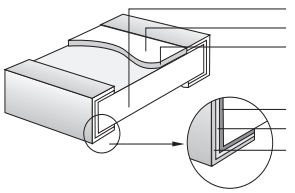
- Low T.C.R ±50PPM/℃ 低T.C.R ±50PPM/℃
- Suitable for reflow & wave soldering 适合波峰焊与回流焊
- Application Precision medical equipment, Auto industrial control system, Communication equipment, IPAD, Portable computer, LED lamps, Intelligent home appliances
  适用于精密医疗器械、自动工业控制系统、通讯设备、IPAD、手提电脑、LED灯具、智能家电产品等

Derating Curve (降功率曲线)



Figures (型状)





1. High purity Alumina substrate (高纯度氧化铝基板)
2. Protective coating (保护层)
3. Resistance element (阻抗元素)
4. Termination (Inner) Ni / Cr [端面(内)镍/铬层]
5. Termination (Between) Ni Barrier [端面(中)镍层]
6. Termination (Outer) Sn [端面(外)锡层(无铅)]

Specification (性能)

Type 类型	Size 尺寸	Max working voltage 最大工作电压	Max Overload Voltage 最大过负荷电压	Dielectric Withstanding Voltage 绝缘耐压	Operating Temperature 工作温度范围
LT02	0402 (1005)	50V	100V	100V	-55~+155℃
LT03	0603 (1608)	75V	150V	300V	
LT05	0805 (2012)	150V	300V	500V	
LT06	1206 (3216)	200V	400V	500V	

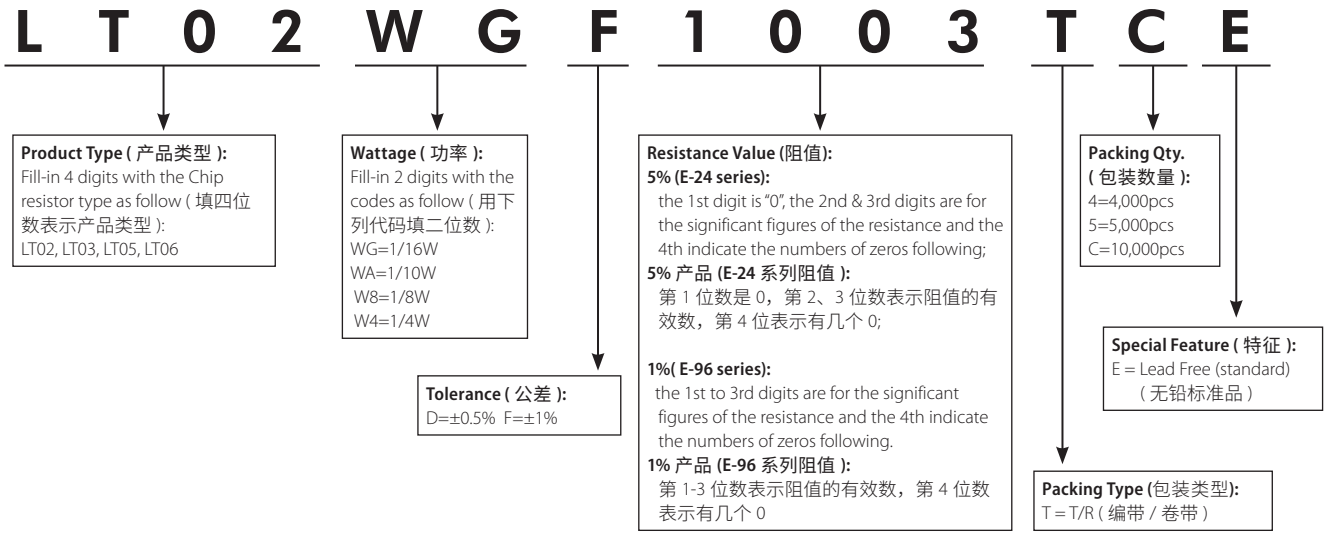
Type 类型	Power 功率 (70°C)	L (mm)	W (mm)	H (mm)	A(mm)	B (mm)	Resistance Range 阻值范围 0.25%, 0.5%, 1%
LT02	1/16W	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10	100Ω~1MΩ
LT03	1/10W	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	1Ω~1MΩ
LT05	1/8W	2.00±0.15	$1.25^{+0.15}_{-0.10}$	0.55±0.10	0.40±0.20	0.40±0.20	
LT06	1/4W	3.10±0.15	$1.55^{+0.15}_{-0.10}$	0.55±0.10	0.45±0.20	0.45±0.20	

Performance Specifications (性能)

Temperature coefficient	温度系数	LT02: ±50ppm/℃ LT03: 1Ω≤R≤10Ω: ±100ppm/℃ 10Ω<R≤1MΩ: ±50ppm/℃ LT05: 1Ω≤R≤10Ω: ±100ppm/℃ 10Ω<R≤1MΩ: ±50ppm/℃ LT06: 1Ω≤R≤10Ω: ±100ppm/℃ 10Ω<R≤1MΩ: ±50ppm/℃
Short-time overload	短时间过负荷	±(1.0%+0.05Ω)
Terminal Bending	端子弯曲	±(1.0%+0.05Ω)
Solderability	可焊性	Coverage must be over 95%.
Soldering heat	耐焊接热	±(1.0%+0.05Ω)
Humidity (Steady State)	恒定温热	±(0.5%+0.05Ω)
Load life	负载寿命	±(1.0%+0.05Ω)

Ordering Procedure (Example: LT02 1/16W 1% 100KΩ T/R-10000)

订购方式 (例如: LT02 1/16W 1% 100KΩ T/R-10000)



Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明。

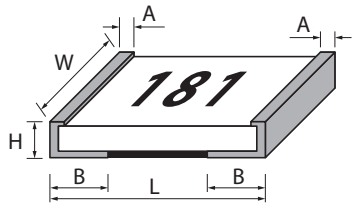
Flex LED Strip use Thick Film Chip Resistor - LE

软灯条专用芯片电阻器 - LE系列

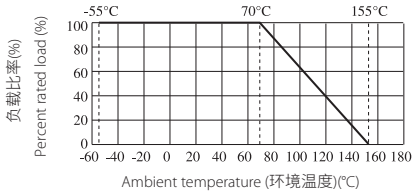
Feature (特性)

- Tolerance 精度为: ±0.5%~±5%
- Flex LED strip use thick film chip resistor 软灯条专用电阻
- Resistance range 阻值范围为: 10Ω~820Ω
- Operating temperature range 工作温度范围为: -55℃ ~+155℃
- Stable electrical capability ,high reliability 电性能稳定,可靠性高
- Suit for reflow 适合于回流焊焊接
- Low assembly cost, suit for automatic SMT equipment 装配成本低,并与自动装贴设备匹配
- Superior mechanical strength and high frequency characteristics 机械强度高、高频特性优越
- According with ROHS standard and Halogen-free 符合ROHS,无卤

Dimension (尺寸) mm



Derating Curve (降功率曲线)



Type 类型	Size 尺寸	Max Working Voltage 最大工作电压	Max Overload Voltage 最大过负荷电压	Temperature Coefficient 温度系数	Dielectric Withstanding Voltage 绝缘耐压	Operating Temperature Range 工作温度范围
LE05	0805	200V	400V	±200PPM/℃	500V	-55~+155℃
LE06	1206					

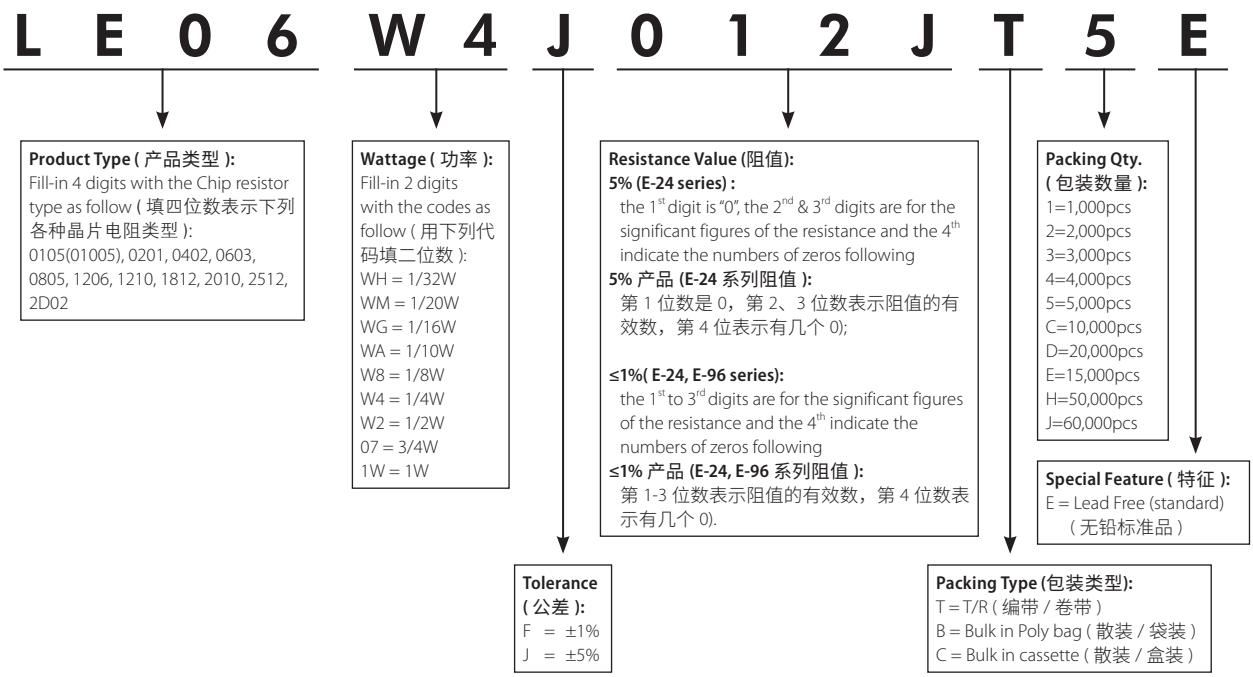
Type 类型	Size 尺寸	Power (功率) (70°C)	L (mm)	W (mm)	H (mm)	A (mm)	B (mm)	Resistance Range (阻值范围)
LE05	0805	1/8W	2.00±0.15	1.25 +0.15 -0.10	0.55±0.10	≤1.0	0.40±0.20	10Ω~820Ω
LE06	1206	1/4W	3.10±0.15	1.55 +0.15 -0.10	0.55±0.10	≤1.0	0.50±0.20	

Performance Specifications (性能)

Temperature coefficient	温度系数	±200ppm/°C
Short time overload	短时间过负荷	±1%: ±(1%+0.1Ω) ±5%: ±(2%+0.1Ω)
Insulation resistance	绝缘电阻	≥ 1,000 MΩ
Dielectric withstanding voltage	绝缘耐压	No evidence of flashover, mechanical damage, arcing or insulation breakdown 无击穿，飞弧及可见机械性损伤
Terminal bending	端子弯曲	±(1.0% + 0.05Ω)
Soldering heat	耐焊接热	±(1.0% + 0.005Ω)
Solderability	可焊性	Coverage must be over 95%.
Rapid change of temperature	温度快速变化	±1%: ±(1%+0.1Ω) ±5%: ±(3%+0.1Ω)
Humidity (Steady State)	恒定湿热	±1%: ±(0.5%+0.1Ω) ±5%: ±(3%+0.1Ω)
Load life in humidity	湿度寿命	±1%: ±(1%+0.05Ω) ±5%: ±(3%+0.05Ω)
Load life	负载寿命	±1%: ±(1%+0.1Ω) ±5%: ±(3%+0.1Ω)

Ordering Procedure (Example: LE06 1/4W 5% 1.2 Ω T/R-5000)

订购方式 (例如: LE06 1/4W 5% 1.2 Ω T/R-5000)



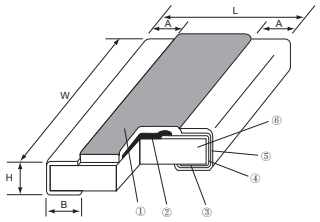
Wide Terminal Thick Film Chip Resistor - WR

宽电极厚膜晶片电阻器 - WR系列

Feature (特性)

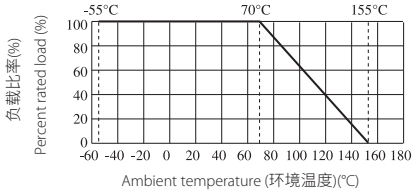
- High power & Wide terminal 高功率，宽电极
- Suitable for both wave & re-flow soldering 适合波峰焊及回流焊
- Application:AV adapters, LCD back-light,camera strobe etc.
  适用于AV适配器，LCD背光电路，照相机阀门等

Figures (型状)



1. Protective layer (保护层)
2. Resistive element (阻抗元素)
3. Termination (Inner) Ni / Cr [端面(内)镍/铬层]
4. Termination (Between) Ni [端面(中)镍层]
5. Termination (Outer) Sn [端面(外)锡层(无铅)]
6. High purity Alumina substrate (高纯度氧化铝基板)

Derating Curve & Specification (降功率曲线及性能)



Type 类型	L (mm)	W(mm)	H(mm)	A(mm)	B(mm)
WR08(0508)	1.20±0.10	2.0±0.10	0.55±0.10	0.20±0.10	0.30±0.20
WR12(0612)	1.60±0.15	3.20±0.15	0.55±0.10	0.30±0.20	0.45±0.20
WR20(1020)	2.50±0.15	5.00±0.15	0.55±0.10	0.40±0.20	0.60±0.20
WR18(1218)	3.10±0.10	4.60±0.15	0.55±0.10	0.45±0.20	0.40±0.20
WR25(1225)	3.10±0.15	6.25±0.15	0.55±0.10	0.45±0.20	0.65±0.20

Type 类型	Size 尺寸	Power 功率 70°C	Resistance Range 阻值范围 1%	Resistance Range 阻值范围 5%	Max. Working Voltage 最大工作电压 / 电流	Max. Overload Voltage 最大过负荷电压 / 电流	Dielectric Withstanding Voltage 绝缘耐压	Operating Temperature 工作温度范围	T.C.R 温度系数 PPM/°C
WR08	0508 (1220)	1/3W	10Ω~1M		150V	300V	500V	-55°C ~155°C	10R: ±400 10Ω<R≤100Ω±200 >100Ω:±100
		2/3W	10mΩ~10Ω		/	/			10mΩ≤R<30mΩ:0~+400 30mΩ≤R≤10Ω:0~+150
		/	<50mΩ		4A	8A			/
WR12	0612 (1632)	1/2W	10Ω<R≤1M		200V	400V			10Ω<R≤100Ω±200 >100Ω:±100
		1W	10mΩ≤R≤10Ω		/	/			10mΩ≤R < 100mΩ:0~+200 100mΩ≤R≤10Ω:0~+150
		/	<50mΩ		5A	10A			/
WR20	1020 (2550)	1W	10Ω~1M	1Ω~1M	200V	400V			1Ω<R ≤ 10Ω:±400 10Ω<R≤100Ω±200 >100Ω:±100
			10mΩ~1Ω		/	/			10mΩ≤R ＜ 30mΩ :0~+200 30mΩ≤R≤1Ω :0~+100
		/	<50mΩ		6A	12A			/
WR18	1218 (3245)	1W	10mΩ~1M		200V	400V			10mΩ≤R ＜ 30mΩ :0~+200 30mΩ≤R≤1Ω :0~+100 1Ω<R ≤ 10Ω:±400 10Ω<R≤100Ω±200 >100Ω:±100
		/	<50mΩ		6A	10A			/
WR25	1225 (3264)	2W	1Ω<R≤1M		200V	400V			1Ω<R ≤ 10Ω:±400 10Ω<R≤100Ω±200 >100Ω:±100
		3W	10mΩ≤R≤1Ω		/	/			10mΩ≤R ＜ 30mΩ :0~+150 30mΩ≤R≤1Ω :0~+100
		/	<50mΩ		6A	15A			/

Performance Specification (性能)

Short-time overload	短时间过负荷	±5%：±(2.0%±0.005Ω) ±1%： ±(1.0%±0.005Ω)
Dielectric withstanding voltage	绝缘耐压	No evidence of flashover mechanical damage, arcing or insulation break down. 无击穿，飞弧及可见机械性损伤
Terminal bending	端子弯曲	± （1.0%+±0.005Ω）
Soldering heat	耐焊接热	± (1.0%+0.005Ω)
Solderability	可焊性	Coverage must be over 95%.
Rapid change of temperature	温度快速变化	±5%：±(1.0%±0.005Ω) ±1%： ±(0.5%±0.005Ω)
Load life in humidity	湿度寿命	±5%：±(3.0%±0.005Ω) ±1%： ±(1.0%±0.005Ω)
Load life	负载寿命	±5%：±(3.0%±0.005Ω) ±1%：±(1.0%±0.005Ω)

Ordering Procedure (Example:Wide Terminal WR18 1W 5% 120KΩ T/R-4000)

订购方式(例如:宽电极WR18 1W 5% 120KΩ T/R-4000)

W R 1 8 1 W J 0 1 2 4 T 4 E

Product Type (产品类型):
Fill-in 4 digits with the Chip resistor type as follow (填四位数表示产品类型):
WR08, WR12, WR20, WR18, WR25

Wattage (功率):
Fill-in 2 digits with the codes as follow (用下列代码填二位数):
W3=1/3W
W2=1/2W
1W=1W
WK=2/3W
2W=2W
3W=3W

Tolerance (公差):
F = ±1%
J = ±5%

Resistance Value (阻值):
5% (E-24 series):
the 1st digit is "0", the 2nd & 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following;
5% 产品 (E-24 系列阻值):
第 1 位数是 0，第 2、3 位数表示阻值的有效数，第 4 位表示有几个 0;

1%(E-24, E-96 series):
the 1st to 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following.
1% 产品 (E-24, E-96 系列阻值):
第 1-3 位数表示阻值的有效数，第 4 位数表示有几个 0

Packing Type (包装类型):
T = T/R (编带 / 卷带)
B = Bulk in Poly bag (散装 / 袋装)
C = Bulk in cassette (散装 / 盒装)

Packing Qty. (包装数量):
4=4,000pcs
5=5,000pcs

Special Feature (特征):
E = Lead Free (standard) (无铅标准品)

Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明。

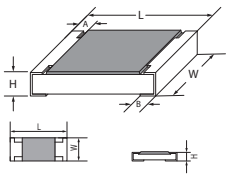
Trimmable Thick Film Chip Resistors - TR

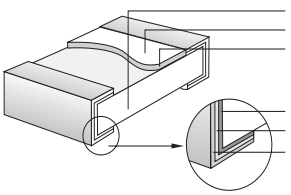
可调厚膜晶片电阻器 - TR系列

Feature (特性)

- Apply to stable circuit instead of regulating circuit to adjust the application of resistance (laser adjusting resistance machine in client end)
  适用于稳定电路中，代替调节电路来调节阻值的应用(客户端激光调阻机)
- Superior heat & humidity withstanding performance 良好的耐温耐湿性

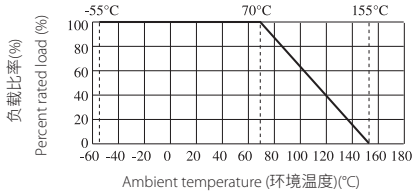
Figures (型状)





1. High purity Alumina substrate (高纯度氧化铝基板)
2. Protective coating (保护层)
3. Resistance element (阻抗元素)
4. Termination (Inner) Ni / Cr [端面(内)镍/铬层]
5. Termination (Between) Ni Barrier [端面(中)镍层]
6. Termination (Outer) Sn [端面(外)锡层(无铅)]

Derating Curve & Specification (降功率曲线及性能)



Type 类型	Max. Working Voltage 最大工作电压	Max. Overload Voltage 最大过负荷电压	Operating Temperature 工作温度范围
TR03	75V	150V	-55°C~155°C
TR05	150V	300V	-55°C~155°C
TR06	200V	400V	-55°C~155°C

Type 类型	Size 尺寸	Power Rating 功率 70°C	L(mm)	W(mm)	H(mm)	A(mm)	B(mm)	Tolerance 公差	Resistance Range 阻值范围 (E-12)
TR03	0603 (1608)	1/10W	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30± 0.20	R: 0~30% Q: 0~20% T: 0~10% S: -10~0% N: -20~0% P: -30~0% J: ±5% K: ±10% M: ±20%	1Ω~1M
TR05	0805 (2012)	1/8W	2.00±0.15	1.25 +0.15 -0.10	0.55±0.10	0.40±0.20	0.40± 0.20		
TR06	1206 (3216)	1/4W	3.10±0.15	1.55 +0.15 -0.10	0.55±0.10	0.45±0.20	0.45±0.20		

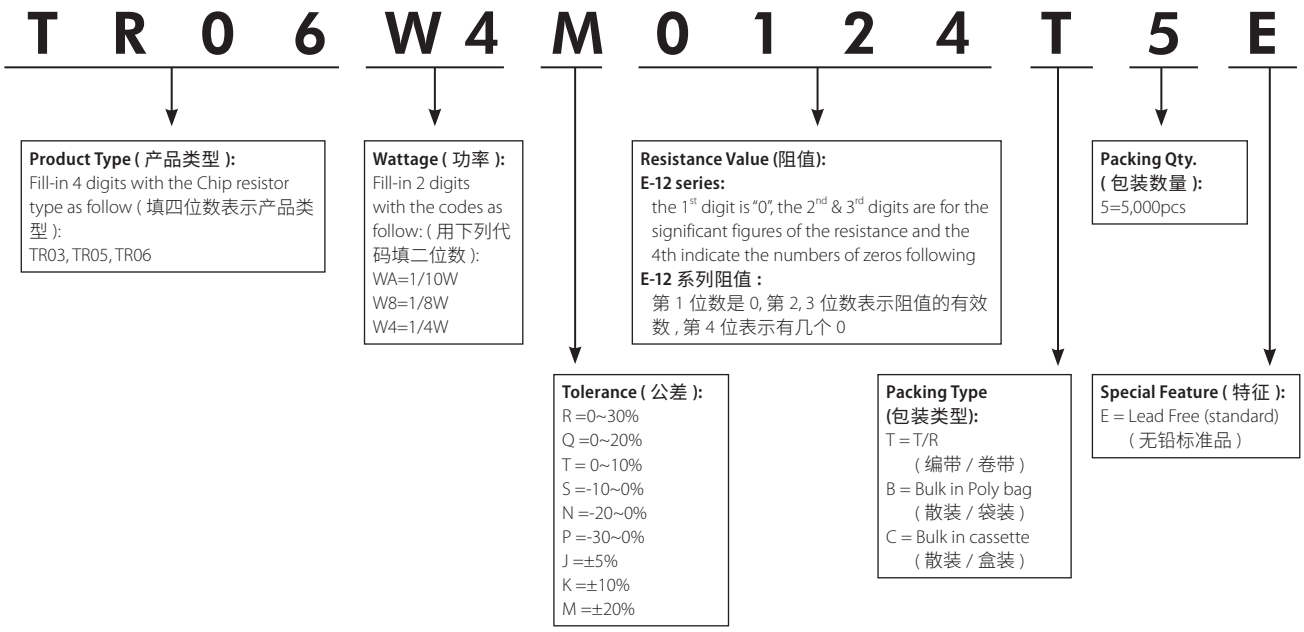
Performance Specification (性能)

Temperatre coefficient	温度系数	TR03: 1Ω≤R≤10Ω: ±400ppm/°C >10Ω: ±200ppm/°C TR05, TR06: ±200PPM/°C
Short-time overload	短时间过负荷	±(2.0%+0.1Ω)
Terminal bending	端子弯曲	±(1.0%+0.05Ω)
Solderability	可焊性	Coverage must be over 95%.
Soldering heat	耐焊接热	±(1.0%+0.05Ω)
Rapid change of temperature	温度快速变化	±(1.0%+0.05Ω)
Load life in humidity	湿度寿命	±(3.0%+0.1Ω)
Load life	负载寿命	±(3.0%+0.1Ω)

Ordering Procedure (Example: Trimmable TR06 1/4W ±20% 120KΩ T/R-5000)

订购方式 (例如: 可调 TR06 1/4W ±20% 120KΩ T/R-5000)

The values which are not of standard E-12 series could be offered on a case to case basis.
阻值如不在 E-12 系列的可特别提供。



Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明 。

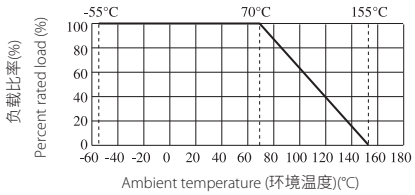
Anti-Electro Static Discharge Thick Film Chip Resistors - ES

ESD 抗静电厚膜电阻器 - ES系列

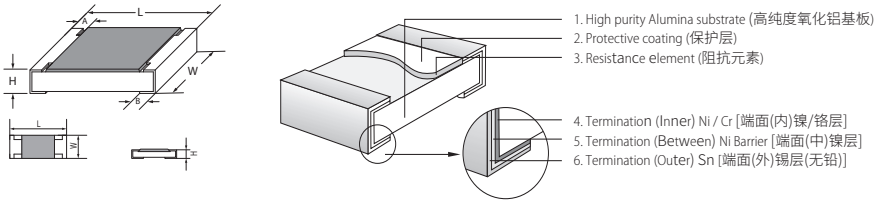
Feature (特性)

- Anti-Electro Static Discharge 抗静电
- High voltage 耐高压
- Suitable for reflow & wave soldering 适合波峰焊与回流焊
- Application Medical Devices, Industrial Controls, AV adapter, Flash lamp of camera, Automotive Industry, Outdoor Equipments
  适用于医疗器械、工业控制、电源适配器、照相机的闪光灯、汽车工业及户外设备等

Derating Curve (降功率曲线)



Figures (型状)



Specification (性能)

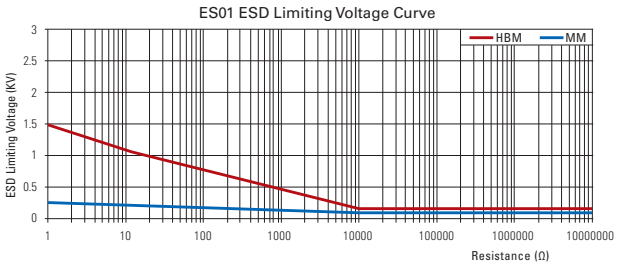
Type 类型	Size 尺寸	Max working voltage 最大工作电压	Max Overload Voltage 最大过负荷电压	Dielectric Withstanding Voltage 绝缘耐压	Operating Temperature 工作温度范围
ES01	0201 (0603)	25V	50V	/	-55~+155℃
ES02	0402 (1005)	50V	100V	100V	
ES03	0603 (1608)	150V	200V	300V	
ES05	0805 (2012)	200V	400V	500V	
ES06	1206 (3216)	500V	1000V	500V	
ES07	1210 (3225)	800V	1500V	500V	

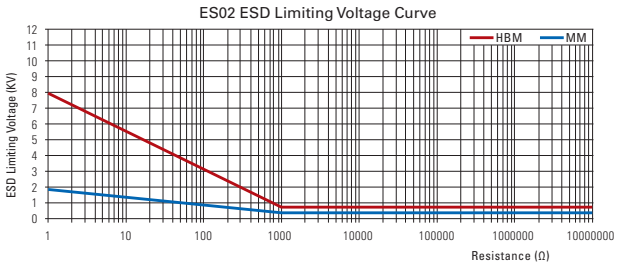
Type 类型	Power 功率 (70°C)	L (mm)	W (mm)	H (mm)	A(mm)	B (mm)	Resistance Range 阻值范围 1% & 5%
ES01	1/20W	0.60±0.03	0.30±0.03	0.23±0.03	0.10±0.05	0.15±0.05	1Ω~10MΩ
ES02	1/16W	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10	
ES03	1/4W	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	
ES05	2/5W	2.00±0.15	$1.25^{+0.15}_{-0.10}$	0.55±0.10	0.40±0.20	0.40±0.20	
ES06	2/3W	3.10±0.15	$1.55^{+0.15}_{-0.10}$	0.55±0.10	0.45±0.20	0.45±0.20	
ES07	1/2W	3.10±0.10	2.60±0.20	0.55±0.10	0.50±0.25	0.50±0.20	

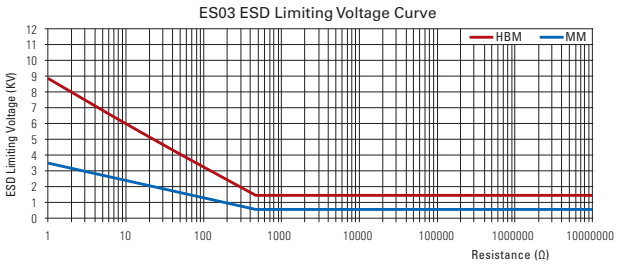
Performance Specifications (性能)

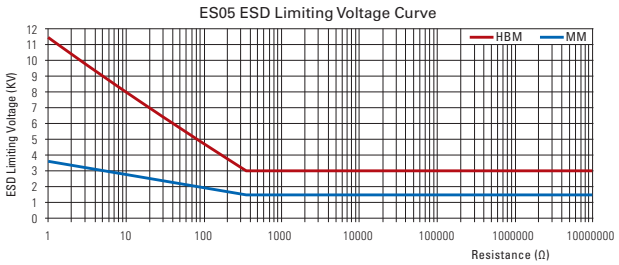
Temperature coefficient	温度系数	ES01: 1Ω≤R≤10Ω: ±400ppm/°C 10Ω<R≤10MΩ: ±200ppm/°C ES02~ES07: 1Ω≤R≤10Ω: ±200ppm/°C 10Ω<R≤10MΩ: ±100ppm/°C
Short-time overload	短时间过负荷	±1%:±(1.0%+0.1Ω) ±5%:±(2.0%+0.1Ω)
Terminal Bending	端子弯曲	±(1.0%+0.05Ω)
Solderability	可焊性	Coverage must be over 95%.
Soldering heat	耐焊接热	±(1.0%+0.05Ω)
Humidity (Steady State)	恒定温热	±1%:±(0.5%+0.1Ω) ±5%:±(3.0%+0.1Ω)
Dielectric withstanding voltage	绝缘耐压	No evidence of flashover, mechanical damage, arcing or insulation breakdown 无击穿,飞弧及可见机械性损伤
Rapid change of temperature	温度快速变化	±1%:±(0.5%+0.05Ω) ±5%:±(1.0%+0.05Ω)
Load life	负载寿命	±1%:±(1.0%+0.1Ω) ±5%:±(3.0%+0.1Ω)
ESD	抗静电	±(1.0%+0.05Ω)

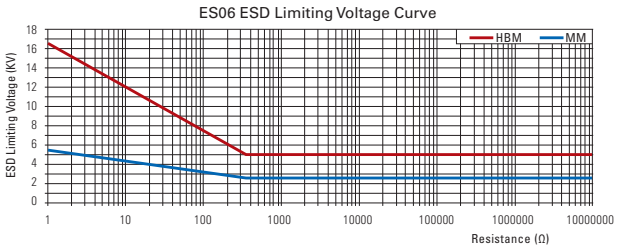
ESD Limiting Voltage Curve (抗静电曲线)

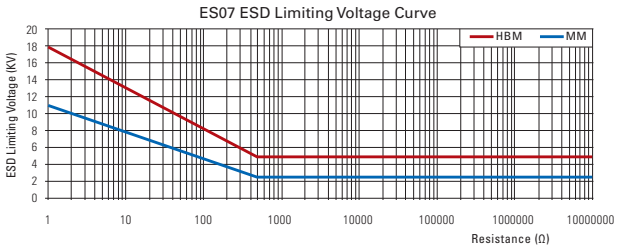












NOTE 备注： HBM:100PF 1K5 1Cycle; MM:200PF 0Ω 1Cycle

Ordering Procedure (Example: ES06 2/3W 5% 1.2Ω T/R-5000)

订购方式 (例如: ES06 2/3W 5% 1.2Ω T/R-5000)

E S 0 6 W K J 0 1 2 J T 5 E

Product Type (产品类型):
Fill-in 4 digits with the Chip resistor type as follow (填四位数表示产品类型):
ES01, ES02, ES03, ES05, ES06, ES07

Wattage (功率):
Fill-in 2 digits with the codes as follow (用下列代码填二位数):
WM=1/20W
WG=1/16W
WA=1/10W
W8=1/8W
W4=1/4W
W3=1/3W
WK=2/3W
07 = 3/4W
04 = 2/5W

Tolerance (公差):
F=±1% J=±5%

Resistance Value (阻值):
5% (E-24 series):
the 1st digit is "0", the 2nd & 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following;
5% 产品 (E-24 系列阻值):
第 1 位数是 0，第 2、3 位数表示阻值的有效数，第 4 位表示有几个 0;

1%(E-96 series):
the 1st to 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following.
1% 产品 (E-96 系列阻值):
第 1-3 位数表示阻值的有效数，第 4 位数表示有几个 0

Packing Qty.
(包装数量):
5=5,000pcs
c=10,000pcs
E=15,000pcs

Special Feature (特征):
E = Lead Free (standard)
(无铅标准品)

Packing Type (包装类型):
T = T/R (编带 / 卷带)

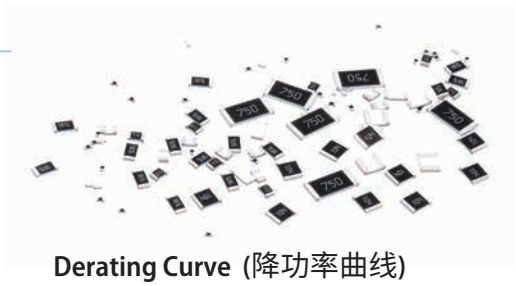
Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明 。

Non-magnetic Thick Film Chip Resistors - NM

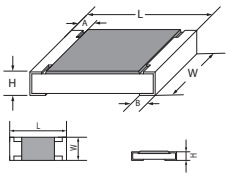
无磁厚膜晶片电阻器 - NM系列

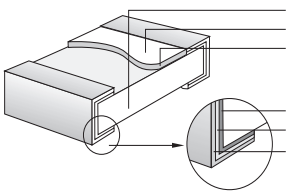
Feature (特性)

- Non-magnetic 无磁性
- Suitable for reflow & wave soldering 适合波峰焊与回流焊
- Application Mobile Phone, PDA, Setbox, Meter 适用于移动电话、PDA、机顶盒、仪表



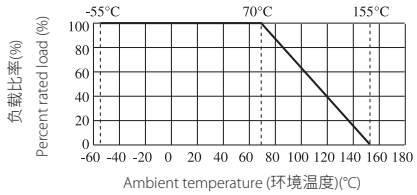
Figures (型状)





1. High purity Alumina substrate (高纯度氧化铝基板)
2. Protective coating (保护层)
3. Resistance element (阻抗元素)
4. Termination (Inner) Ni / Cr [端面(内)镍/铬层]
5. Termination (Between) Ni Barrier [端面(中)镍层]
6. Termination (Outer) Sn [端面(外)锡层(无铅)]

Derating Curve (降功率曲线)



Specification (性能)

Type 类型	Size 尺寸	Max working voltage 最大工作电压	Max Overload Voltage 最大过负荷电压	Operating Temperature 工作温度范围
NM02	0402 (1005)	50V	100V	-55~+155℃
NM03	0603 (1608)	75V	150V	
NM05	0805 (2012)	150V	300V	
NM06	1206 (3216)	200V	400V	
NM12	2512 (6432)	200V	500V	

Type 类型	Power 功率 (70°C)	L (mm)	W (mm)	H (mm)	A (mm)	B (mm)	Resistance Range 阻值范围 1%(E96), 5%(E24)
NM02	1/16W	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10	1Ω~10M
NM03	1/10W	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	
NM05	1/8W	2.00±0.15	$1.25^{+0.15}_{-0.10}$	0.55±0.10	0.40±0.20	0.40±0.20	
NM06	1/4W	3.10±0.15	$1.55^{+0.15}_{-0.10}$	0.55±0.10	0.45±0.20	0.45±0.20	
NM12	1W	6.35±0.10	3.20±0.20	0.55±0.10	0.60±0.25	0.50±0.20	

Performance Specification (性能)

Temperature coefficient	温度系数	1Ω≤R≤10 Ω: ±400ppm/°C 10Ω<R≤100 Ω: ±200ppm/°C R>100Ω: ±100ppm /°C
Short-time overload	短时间过负荷	±1%:±(1.0%+0.1Ω) ±5%:±(2.0%+0.1Ω)
Terminal bending	端子弯曲	±(1.0%+0.05Ω)
Solderability	可焊性	Coverage must be over 95%.
Soldering heat	耐焊接热	±(1.0%+0.05Ω)
Humidity (Steady State)	恒定湿热	±1%:±(0.5%+0.1Ω) ±5%:±(3.0%+0.1Ω)
Dielectric withstanding voltage	绝缘耐压	No evidence of flashover, mechanical damage, arcing or insulation breakdown 无击穿，飞弧及可见机械性损伤
Rapid change of temperature	温度快速变化	±1%:±(0.5%+0.05Ω) ±5%:±(1.0%+0.05Ω)
Load life	负载寿命	±1%:±(1.0%+0.1Ω) ±5%:±(3.0%+0.1Ω)

Ordering Procedure (Example: NM02 1/16W 5% 1.2 Ω T/R-10000)

订购方式 (例如: NM02 1/16W 5% 1.2 Ω T/R-10000)

N M 0 2 W G J 0 1 2 J T C E

Product Type (产品类型):
Fill-in 4 digits with the Chip resistor type as follow (填四位数表示产品类型) :
NM02, NM03, NM05, NM06, NM12

Wattage (功率):
Fill-in 2 digits with the codes as follow (用下列代码填二位数):
WG=1/16W
WA=1/10W
W8=1/8W
W4=1/4W
1W=1W

Tolerance (公差):
F = ±1%
J = ±5%

Resistance Value (阻值):
5% (E-24 series) :
the 1st digit is "0", the 2nd & 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following
5% 产品 (E-24 系列阻值):
第 1 位数是 0，第 2、3 位数表示阻值的有效数，第 4 位表示有几个 0);
≤1%(E-96 series):
the 1st to 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following
1% 产品 (E-96 系列阻值):
第 1-3 位数表示阻值的有效数，第 4 位数表示有几个 0).

Packing Qty. (包装数量)
4=4,000pcs
5=5,000pcs
C=10,000pcs

Special Feature (特征):
E = Lead Free (standard)
(无铅标准品)

Packing Type (包装类型):
T = T/R (编带 / 卷带)

Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明 。

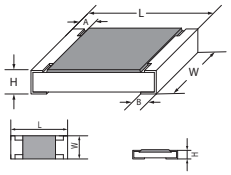
Complete Pb-Free Thick Film Chip Resistor- PF

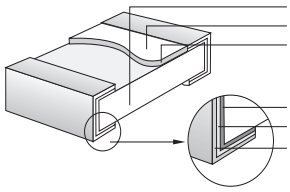
完全无铅厚膜晶片电阻器 - PF系列

Feature (特性)

- Total Lead Free in whole resistor body 电阻本体完全不含铅
- Small size and light weight 体积小、重量轻
- Reduction of assembly costs and matching with placement machine
  可降低装置成本及配合机器组装
- Suitable for both wave & re-flow soldering 适合波峰焊与回流焊

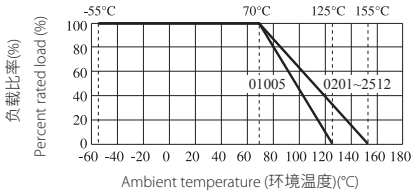
Figures (型状)





1. High purity Alumina substrate (高纯度氧化铝基板)
2. Protective coating (保护层)
3. Resistance element (阻抗元素)
4. Termination (Inner) Ni / Cr [端面(内)镍/铬层]
5. Termination (Between) Ni Barrier [端面(中)镍层]
6. Termination (Outer) Sn [端面(外)锡层(无铅)]

Derating Curve (降功率曲线)



Type 类型	PF0A	PF01	PF02	PF03	PF05	PF06	PF07	PF11	PF10	PF12
Size 尺寸	01005 (0402)	0201 (0603)	0402 (1005)	0603 (1608)	0805 (2012)	1206 (3216)	1210 (3225)	1812 (4532)	2010 (5025)	2512 (6432)
Max. Working Voltage 最大工作电压	15V	25V	50V	75V	150V	200V	200V	200V	200V	200V
Max.Overload Voltage 最大过负荷电压	30V	50V	100V	150V	300V	400V	500V	500V	500V	500V
Dielectric Withstanding Voltage 绝缘耐压	-	-	100V	300V	500V	500V	500V	500V	500V	500V
Operating Temperature 工作温度范围	-55°C~ +125°C	-55°C~+155°C								

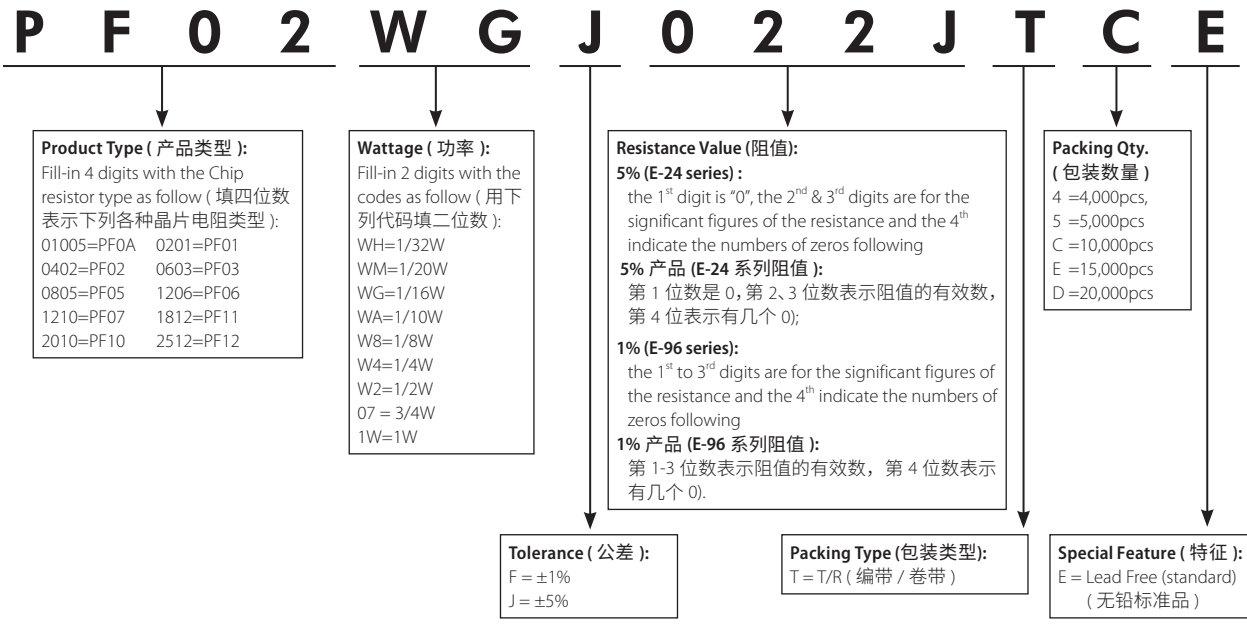
Type 类型		PF0A	PF01	PF02	PF03	PF05	PF06	PF07	PF11	PF10	PF12
Power Rating at 70°C 功率		1/32W	1/20W	1/16W	1/10W	1/8W	1/4W	1/2W	3/4W	3/4W	1W
Dimension 尺寸	L(mm)	0.40±0.02	0.60±0.03	1.00±0.10	1.60±0.10	2.00±0.15	3.10±0.15	3.10±0.10	4.50±0.20	5.00±0.10	6.35±0.10
	W(mm)	0.20±0.02	0.30±0.03	0.50±0.05	0.80±0.10	$1.25^{+0.15}_{-0.10}$	$1.55^{+0.15}_{-0.10}$	2.60±0.20	3.20±0.20	2.50±0.20	3.20±0.20
	H(mm)	0.13±0.02	0.23±0.03	0.35±0.05	0.45±0.10	0.55±0.10	0.55±0.10	0.55±0.10	0.55±0.20	0.55±0.10	0.55±0.10
	A(mm)	0.10±0.05	0.10±0.05	0.20±0.10	0.30±0.20	0.40±0.20	0.45±0.20	0.50±0.25	0.50±0.20	0.60±0.25	0.60±0.25
	B(mm)	0.10±0.03	0.15±0.05	0.25±0.10	0.30±0.20	0.40±0.20	0.45±0.20	0.50±0.20	0.50±0.20	0.50±0.20	0.50±0.20
Resistance Value of Jumper 零欧姆电阻阻值		<50mΩ									
Rated Current of Jumper 零欧姆电阻额定电流		0.5A	0.5A	1A	1A	2A	2A	2A	2A	2A	2A
Max.Overload Current of Jumper 零欧姆电阻最大过负荷电流		1A	1A	2A	2A	5A	10A	10A	10A	10A	10A
Resistance Range of 1% (E-96) 1% 的阻值范围 (E-96)		10Ω~10MΩ	1Ω~10MΩ								
Resistance Range of 5% (E-24) 5% 的阻值范围 (E-24)		1Ω~10MΩ									

Performance Specifications (性能)

Temperature coefficient	温度系数	**PF0A:** 1Ω≤R≤10Ω: -200~600ppm/℃ 10Ω<R≤100Ω: ±300ppm/℃ >100Ω: ±200ppm/℃ **PF01:** 1Ω≤R≤10Ω: -100~350ppm/℃ >10Ω: ±200ppm/℃ **PF02, PF03, PF05, PF06, PF07, PF10, PF11, PF12:** 1Ω≤R≤10Ω: ±400ppm/℃ 10Ω<R≤100Ω: ±200ppm/℃ >100Ω: ±100ppm/℃
Short-time overload	短时间过负荷	±5%, ± 2%: ±(2.0% + 0.1Ω) ±1%, ± 0.5%: ±(1.0% + 0.1Ω) PF0A：±(2.0% + 0.1Ω)
Insulation resistance	绝缘电阻	≥ 1,000 MΩ
Dielectric withstanding voltage	绝缘耐压	No evidence of flashover, mechanical damage, arcing or insulation breakdown 无击穿，飞弧及可见机械性损伤
Terminal bending	端子弯曲	±(1.0% + 0.05Ω)
Soldering heat	耐焊接热	±(1.0% + 0.05Ω)
Solderability	可焊性	Coverage must be over 95%.
Rapid change of temperature	温度快速变化	±5%, ± 2%: ±(1.0% + 0.05Ω) ±1%, ± 0.5%: ±(0.5% + 0.05Ω) PF0A：±(1.0% + 0.05Ω)
Humidity (Steady State)	恒定湿热	±5%, ± 2%: ±(3.0% + 0.1Ω) ±1%, ± 0.5%: ±(0.5% + 0.1Ω) PF0A：±(3.0% + 0.1Ω)
Load life in humidity	湿度寿命	±5%, ± 2%: ±(3.0% + 0.1Ω) ±1%, ± 0.5%: ±(1% + 0.1Ω) PF0A：±(3.0% + 0.1Ω)
Load life	负载寿命	±5%, ± 2%: ±(3.0% + 0.1Ω) ±1%, ± 0.5%: ±(1% + 0.1Ω) PF0A：±(3.0% + 0.1Ω)

Ordering Procedure (Example: PF02 1/16W 5% 2.2Ω T/R-10000)

订购方式 (例如: PF02 1/16W 5% 2.2Ω T/R-10000)



Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明。

High-Precision Thin Film Chip Resistors - TC

高精密薄膜晶片电阻器-TC系列

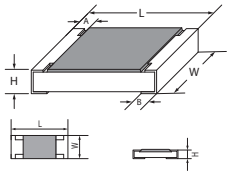
Feature (特性)

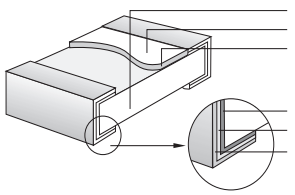
- Thin film NiCr Resistance element
  薄膜镍铬阻抗组件
- Very tight tolerance ±0.05% ~ ±1%
  高精密的公差 ±0.05% ~ ±1%
- Extremely low TCR ±5ppm~±50ppm
  极低的温度系数 ±5ppm~±50ppm
- Completed Lead-free 完全无铅产品

Application (应用)

- Automotive 汽车电子
- Automatic equipment 自动化设备
- Communication & telecom 通信终端及设备
- Industrial 工业电子
- Medical Equipment 医疗器材

Figures (型状)





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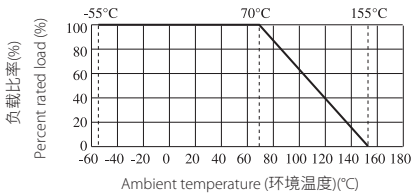


Type 类型	Size 尺寸	L (mm)	W (mm)	H (mm)	A (mm)	B (mm)
TC02	0402 (1005)	1.00±0.10	0.50±0.05	0.35±0.05	0.2±0.1	0.25±0.10
TC03	0603 (1608)	1.60±0.10	0.80±0.10	0.45±0.10	0.3±0.2	0.30±0.20
TC05	0805 (2012)	2.00±0.15	$1.25^{+0.15}_{-0.10}$	0.55±0.10	0.3±0.2	0.40±0.20
TC06	1206 (3216)	3.10±0.15	$1.55^{+0.15}_{-0.10}$	0.55±0.10	0.4±0.2	0.45±0.20
TC07	1210 (3225)	3.10±0.10	2.60±0.20	0.55±0.10	0.4±0.2	0.45±0.20
TC10	2010 (5025)	5.00±0.10	2.50±0.20	0.55±0.10	0.5±0.25	0.50±0.20
TC12	2512 (6432)	6.35±0.10	3.20±0.20	0.55±0.10	0.5±0.25	0.50±0.20

Performance Specifications (性能)

Test Item 试验项目	Test Methods 试验方法	Evaluation Criteria 判定标准
Short-time overload 短时间过负荷	2.5x Rated voltage or Max. Overload Voltage whichever is lower for 5 seconds, then check the resistance. 2.5 倍额定电压或最大过负荷电压 (取其低者), 持续 5 秒钟 , 然后测阻值	ΔR≤±0.5%
Insulation resistance 绝缘电阻	1. Chip Resistor：the measuring voltage shall be, measured with a direct voltage of (100±15)V or a voltage equal to the dielectric withstanding voltage, and appiy for 1 min. 2. TH Resistor: the measuring voltage shall be equal to the dielectric withstanding voltage for resistor with an isolation voltage<500V or (500±50)V DC, for resistors with an isolation voltage≥500V. 1. 贴片电阻：绝缘耐压＜ 100V，测试电压取绝缘耐压的电压；绝缘耐压 ≥100V，测试电压为 100±15VDC，1 分钟后量测阻值。 2. 插件电阻：绝缘耐压 ＜ 500V，测试电压取绝缘耐压的电压 ; 绝缘耐压 ≥500V . 测试电压为 500±50VDC，1 分钟后量测阻值。	≥1,000MΩ
Load life in humidity 湿度寿命	Resistance change after 1000 hours (1.5hours"ON"，0.5hours"OFF") at RCWV or Max.Working Voltage whichever less in a humidity test chamber controlled at 40±2°C and 90~95% RH. 持续时间：1000h (1.5h" 通 "，0.5h" 断 ")；试验温度：40±2°C；相对湿度：90~95% RH；试验电压：额定工作电压或最大工作电压 (取其低者)。	ΔR≤±0.5%
Load life 负载寿命	Permanent Resistance change after 1000 hours operating at RCWV or Max.Working Voltage whichever less with duty cycle of 1.5 hours "ON"，0.5 hour "OFF" at 70±2°C ambient. 持续时间：1000h (1.5h" 通 "，0.5h" 断 ")；试验温度：70±2°C；试验电压：额定工作电压或最大工作电压 (取其低者)。	ΔR≤±0.2% >7KΩ ΔR≤±0.5%
Humidity (Steady State) 恒定湿热	Temporary resistance change after 240 hours exposure in a humidity test chamber controlled at 40±2°C and 90~95% RH. 在 40±2°C 和 90~95% RH 相对湿度条件下，存放 240h 后阻值变化率。	ΔR≤±0.3%
Terminal bending 端子弯曲	(Applicable for CHIP Resisters 适用晶片电阻) Twist of Test Board:Y/X=3/90mm 60 seconds. 测试板弯曲：Y/X=3/90mm 60 秒。	ΔR≤±0.2%
Solderability 可焊性	The area covered with a new, smooth, clean, shiny and continuous surface free from concentrated pinholes. Temperature of solder: 245±3°C; Dwell time in solder: 2~3 seconds. 表面光滑、清洁、均匀、有光泽，锡炉温度：245±3°C；浸入时间：2~3 秒。	Coverage must be over 95%.
Soldering heat 耐焊接热	(Applicable forTH Resisters 适用插件电阻) Permanent resister change when leads immersed to a point 2.0~2.5mm from the body in 260±5°C solder 10±1 seconds . 锡炉温度 260±5°C，浸入深度：离本体导线根部约 2.0~2.5mm，处浸入时间 10±1 秒。	ΔR≤±0.2%

Electrical Data (电气参数)

Type 类型	Power Rating 功率 at 70°C	Operating Temperature 工作温度范围	Max.Working Voltage 最大工作电压	Max.Overload Voltage 最大过负荷电压	Dielectric With-standing Voltage 绝缘耐压	Resistance Range 阻值范围			TCR 温度系数
						±0.01%	±0.1%	±0.5%	
TC02	1/16W	-55°C~+155°C	25V	50V	100V	/	100Ω~2KΩ	100Ω~2KΩ	±5PPM/°C
						/	50Ω~12KΩ	50Ω~12KΩ	±10PPM/°C
						/	10Ω~332KΩ	10Ω~332KΩ	±25PPM/°C
						/	10Ω~332KΩ	10Ω~332KΩ	±50PPM/°C
TC03	1/10W	-55°C~+155°C	75V	150V	300V	/	100Ω~4KΩ	100Ω~4KΩ	±5PPM/°C
						/	10Ω~50KΩ	10Ω~50KΩ	±10PPM/°C
						4.7Ω~332K	4.7Ω~1MΩ	1Ω~1MΩ	±25PPM/°C
						4.7Ω~332K	4.7Ω~1MΩ	1Ω~1MΩ	±50PPM/°C
TC05	1/8W	-55°C~+155°C	150V	300V	500V	/	100Ω~15KΩ	100Ω~15KΩ	±5PPM/°C
						/	10Ω~100KΩ	10Ω~100KΩ	±10PPM/°C
						4.7Ω~511K	4.7Ω~2MΩ	1Ω~2MΩ	±25PPM/°C
						4.7Ω~511K	4.7Ω~2MΩ	1Ω~2MΩ	±50PPM/°C
TC06	1/4W	-55°C~+155°C	200V	400V	500V	/	100Ω~15KΩ	100Ω~15KΩ	±5PPM/°C
						/	10Ω~200KΩ	10Ω~200KΩ	±10PPM/°C
						4.7Ω~1M	4.7Ω~3MΩ	1Ω~3MΩ	±25PPM/°C
						4.7Ω~1M	4.70Ω~3MΩ	1Ω~3MΩ	±50PPM/°C
TC07	1/3W	-55°C~+155°C	200V	400V	500V	/	100Ω~15KΩ	100Ω~15KΩ	±5PPM/°C
						/	10Ω~200KΩ	10Ω~200KΩ	±10PPM/°C
						4.7Ω~1M	4.7Ω~3MΩ	1Ω~3MΩ	±25PPM/°C
						4.7Ω~1M	4.7Ω~3MΩ	1Ω~3MΩ	±50PPM/°C
TC10	1/3W	-55°C~+155°C	200V	400V	500V	/	100Ω~25KΩ	100Ω~25KΩ	±5PPM/°C
						/	50Ω~200KΩ	50Ω~200KΩ	±10PPM/°C
	1/2W					4.7Ω~1M	4.7Ω~3MΩ	1Ω~3MΩ	±25PPM/°C
						4.7Ω~1M	4.7Ω~3MΩ	1Ω~3MΩ	±50PPM/°C
TC12	3/4W	-55°C~+155°C	200V	400V	500V	/	100Ω~25KΩ	100Ω~25KΩ	±5PPM/°C
						/	50Ω~200KΩ	50Ω~200KΩ	±10PPM/°C
						10Ω~1M	4.7Ω~3MΩ	1Ω~3MΩ	±25PPM/°C
						10Ω~1M	4.7Ω~3MΩ	1Ω~3MΩ	±50PPM/°C

Ordering Procedure (Example:Thin Film TC06 1/3W 0.1% 25PPM 1KΩ T/R-5000)

订购方式(例如: 薄膜TC06 1/3W 0.1% 25PPM 1KΩ T/R-5000)

T C 0 6 2 5 B 1 0 0 1 T 5 K

Product Type (产品类型):
Fill-in 4 digits with the Chip resistor type as follow (填四位数表示产品类型):
TC02, TC03, TC05, TC06, TC07, TC10, TC12

Temperature coefficient (温度系数):
Fill-in 2 digits with the codes as following
(用下列代码填二位数):
05 = 5PPM 10 = 10PPM
15 = 15PPM 25 = 25PPM
50 = 50PPM

Tolerance (公差):
B = ±0.1%
C = ±0.25%
D = ±0.5%
F = ±1%

Resistance Value (阻值):
≤1%(E-24 & E-96 series)
the 1st to 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following.
≤1% 产品 (E-24, E-96 系列阻值):
第 1-3 位数表示阻值的有效数，第 4 位数表示有几个 0

Packing Type (包装类型):
T = T/R (编带 / 卷带)
B = Bulk in Poly bag (散装 / 袋装)
C = Bulk in cassette (散装 / 盒装)

Packing Qty. (包装数量):
4=4,000pcs,
5=5,000pcs
C=10,000pcs
D=20,000pcs
E= 15,000pcs

Special Feature (特征):
B=1/32W C=1/16W F=1/10W
G=1/8W H=1/6W J=1/4W
K=1/3W M=1/2W N=3/4W
P=1W S=Special

Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明。

Metal foil Chip resistor - MS

合金箔式电阻器 - MS系列

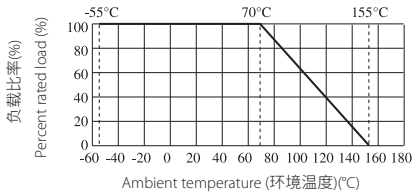
Feature (特性)

- Able to withstand high power 耐高功率
- Ultra Low sensing resistance 超低感应电阻
- Excellent frequency response 优秀的频率响应
- Excellent temperature coefficient characteristics 优秀的温度系数特性

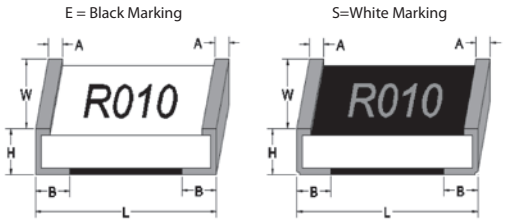
Application (应用)

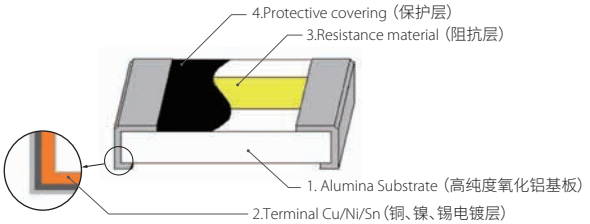
- Mobile electronic equipment-Cellular phone, NB Tablet PC, GPS,DSC, HDD
  移动电话、平板计算机、GPS、DSC、硬盘驱动器
- DC-DC converter, Adapter, Battery pack and charger
  直流转换器、适配器、电池和充电器
- Switching power supply 开关电源
- Voltage Regulation module 电压调整模块
- Power management applications 电源管理应用

Derating Curve (降功率曲线)



Figures (型状)





Specification (性能)

Type 类型	Power Rating 功率 70°C	Dimension(尺寸)(mm) L	W	H	A	B	Resistance Range 阻值范围 ±1% & ±5%	T.C.R. 温度系数 ppm/°C
MS05	1/2W	2.00±0.30	1.20±0.30	0.6±0.20	≤1.0	0.65±0.15	5mΩ ~ 9mΩ	±150
						0.57±0.15	12mΩ ~13mΩ	
						0.42±0.15	10mΩ, 15mΩ ~ 30mΩ	
	1W					0.42±0.15	10mΩ	±50
MS06	1W	3.10±0.20	1.60±0.30	0.70±0.20	≤ 1.0	0.86±0.25	7mΩ	±100
						0.76±0.25	5mΩ ~ 6mΩ, 8mΩ	±100
							27mΩ ~ 35mΩ	±50
						0.46±0.25	10mΩ ~ 25mΩ	±100
							37mΩ ~ 51mΩ	±50
MS10	1.5W	5.00±0.20	2.50±0.25	0.70±0.20	≤ 1.0	1.45±0.30	6mΩ	±50
						1.25±0.30	4mΩ, 7mΩ	
						1.00±0.30	5mΩ, 8mΩ, 10mΩ	±50
							11mΩ~25mΩ, 150mΩ	±30
						0.65±0.30	30mΩ~100mΩ	±30
MS12	3W	6.35±0.20	3.20±0.25	1.00±0.20	≤ 1.0	2.55±0.30	1mΩ	±50
						1.75±0.30	2mΩ	
				0.70±0.20	≤ 1.0	2.15±0.30	3mΩ	±30
						1.75±0.30	4mΩ, 7mΩ, 8mΩ	
						1.35±0.30	5mΩ	
						1.15±0.30	6mΩ, 9mΩ~15mΩ	
						0.90±0.30	16mΩ~100mΩ	
	2W	6.35±0.20	3.20±0.25	0.70±0.20	≤ 1.0	0.90±0.30	101mΩ~200mΩ	

✶ Other sizes and resistor values can be customized on request. 其他规格和阻值可特别提供

Performance Specifications (性能)

Short-time overload	短时间过负荷	1% & 2%: ±(1%+0.001 Ω) 5%: ±(2%+0.001 Ω)
Solderability	可焊性	Coverage must be over 95%.
Low Temperature Storage	低温放置	±(1%+0.001 Ω)
High Temperature Exposure	高温放置	±(1%+0.001 Ω)
Soldering heat	耐焊接热	±(0.5%+0.005Ω)
Load life in humidity	湿度寿命	1% & 2%: ±(1%+0.001 Ω) 5%: ±(3%+0.001 Ω)
Load life	负载寿命	1% & 2%: ±(1%+0.001 Ω) 5%: ±(3%+0.001 Ω)

Ordering Procedure (Example: MS12 3W 1% 10mΩ T/R-4000)

订购方式 (例如: MS12 3W 1% 10mΩ T/R-4000)

M S 1 2 3 W F 1 0 0 M T 4 E

Product Type (产品类型):
Fill-in 4 digits with the Chip resistor type as follow (填四位数表示产品类型):
MS05=0805 MS06=1206
MS10=2010 MS12=2512

Wattage (功率):
Fill-in 2 digits with the codes as follow (用下列代码填二位数):
W2=1/2W 1W=1W
1A =1.5W 2W=2W
3W=3W

Tolerance (公差):
F=±1% J=±5%

Resistance Value (阻值):
5% (E-24 series):
the 1st digit is "0", the 2nd & 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following;
5% 产品 (E-24 系列阻值):
第 1 位数是 0，第 2、3 位数表示阻值的有效数，第 4 位表示有几个 0;

1%(E-24, E-96 series):
the 1st to 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following.
1% 产品 (E-24, E-96 系列阻值):
第 1-3 位数表示阻值的有效数，第 4 位数表示有几个 0

Packing Type (包装类型):
T = T/R (编带 / 卷带)

Packing Qty. (包装数量):
4=4000pcs
5=5000pcs

Special Feature (特征):
E=Black Marking 黑字碼
S=White Marking 白字碼

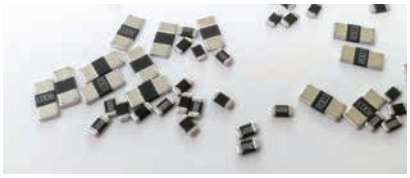
Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明 。

Metal Strip Chip Resistors - LR

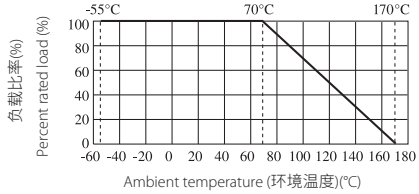
合金体电阻 - LR系列

Feature (特性)

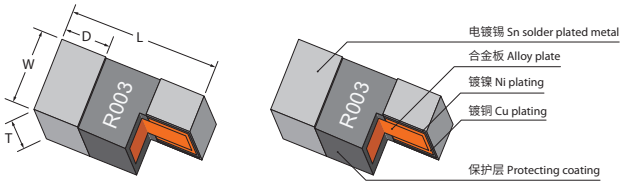
- High power rating up to 3 watts 高功率可达 3W
- Low T.C.R until ±50PPM 较低的温度系数 ±50PPM
- Low resistance values, from 0.5mΩ to 15mΩ 阻值低 0.5mΩ~15mΩ
- low inductance 低电感
- Tolerance: ±1%, ±2%, ±5% 精度 : ±1%, ±2%, ±5%
- RoHS complaint 符合欧盟 ROHS 标准



Derating Curve (降功率曲线)



Figures (型状)



Type 类型	Power Rating at 70°C 额定功率	T.C.R PPM/ °C	Resistance Range(mΩ) 阻值范围	Dimension(mm) 尺寸 L	W	T	D	Color 颜色	Soldering 焊接
Standard 标准									
LR06 (1206)	1W	±100	1~50	3.20±0.25	1.60±0.25	0.60±0.25	0.980±0.25	Black 黑色	IR reflow 回流焊
LR12 (2512)	1W	±100	2,5,3	6.35±0.25	3.18±0.25	Depends on value 由阻值决定	Depends on value 由阻值决定	Black 黑色	Wave or IR reflow 波峰焊或回流焊
			4,5,10						
			6,6.5,7						
			0.5,0.75,1,1.5,2						
			11,12,13,14,15						
High Power Rating 高功率									
LR10 (2010)	1.5W	±200	0.5	5.08±0.25	2.54±0.25	0.60±0.25	1.66±0.63	Black 黑色	IR reflow 回流焊
		±50	0.75~10						
LR12 (2512)	2.0W	±150	2,3,5	6.35±0.25	3.18±0.25	Depends on value 由阻值决定	Depends on value 由阻值决定	Black 黑色	Wave or IR reflow 波峰焊或回流焊
		±100	4,5,10						
		±75	6,6.5,7						
		±50	0.5,0.75,1,1.5,2						
		±50	6.5,7,8,9,10						
	2.5W	±50	4,4.5,5,6						
	3W	±100	0.5,0.75						
		±50	1,1.5,2,3						

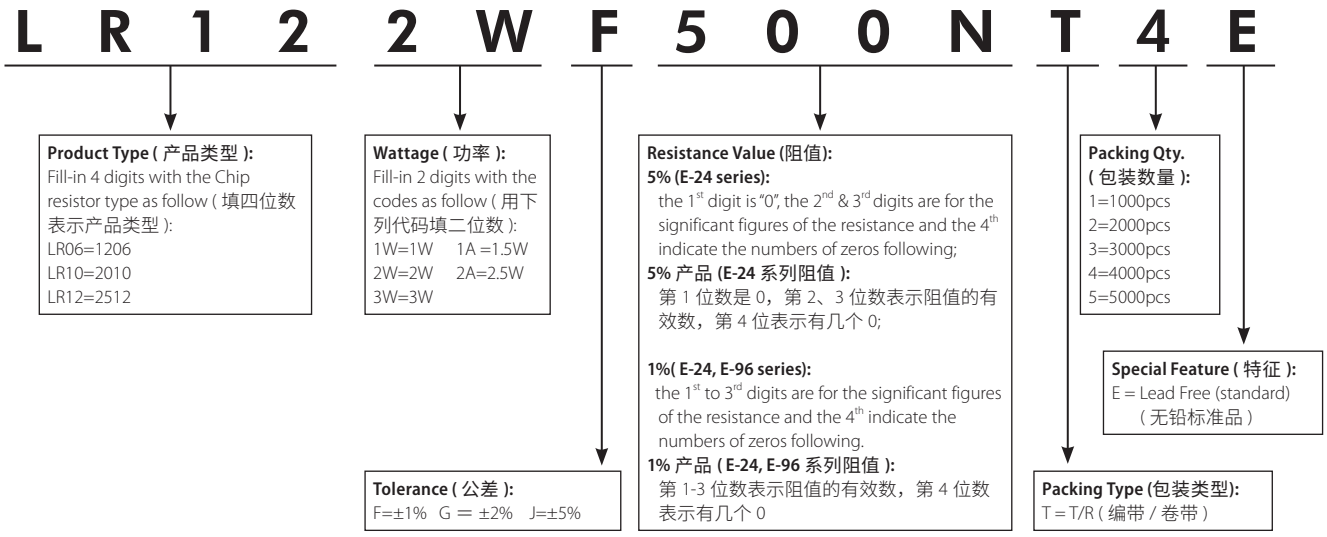
Note: LR12 2W special TCR available case by case on basis. Standard Operating Temp -55°C~+170°C
注意: LR12 2 W 特殊 TCR 可以特别提供。标准的工作温度 -55°C ~ + 170°C

Performance Specifications (性能)

Short-time overload	短时间过负荷	Black coating 黑色涂层 : ±(0.5%+0.0005Ω)
Resistance to Soldering heat	耐焊接热	Black coating 黑色涂层 : ±(0.5%+0.0005Ω)
Solderability	可焊性	Coverage must be over 95%.
Thermal Shock	热冲击	Black coating 黑色涂层 : ±(0.5%+0.0005Ω)
Load life	负载寿命	± (1%+0.0005Ω)

Ordering Procedure (Example:LR12 2W 1% 5mΩ T/R-4000)

订购方式 (例如: LR12 2W 1% 5mΩ T/R-4000)



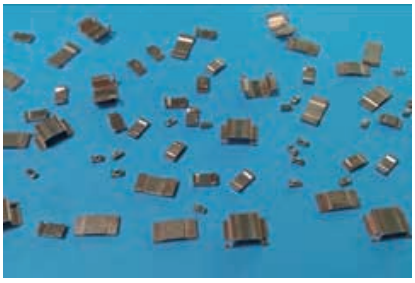
Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明。

Chip Resistors Shunt (RS)

贴片分流电阻器 (RS)

Feature (特性)

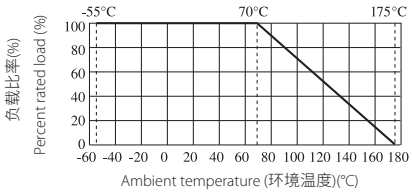
- Electron beam welding structure, stable performance
  电子束焊结构，性能稳定
- RoHS complaint
  符合欧盟 ROHS 标准
- Very low resistance
  极低电阻值



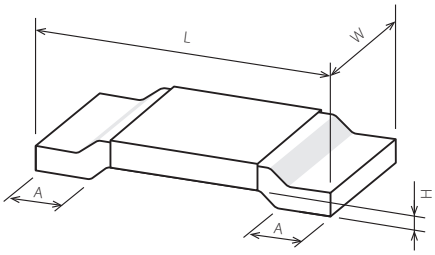
Application (应用)

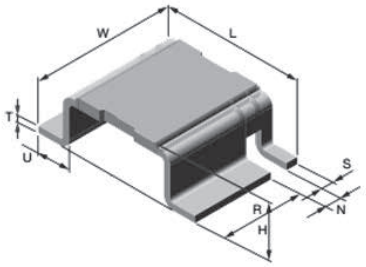
- Used in automobiles,fan,lighting
  应用于汽车、风机、照明
- Current module,electric welding machine,electric tool industry applications
  电流模块，电焊机，电动工具领域应用
- There are two side and four end structures
  有二端及四端引线结构

Derating Curve (降功率曲线)



Dimension (尺寸) mm





Type 类型	Size 规格	Power Rating 功率 70°C	Dimension(尺寸)(mm)				Resistance Range 阻值范围 ±1%	T.C.R. 温度系数
			L	W	H	A		
RS12	2512	3W	6.30±0.20	3.10±0.30	0.50±0.10	1.20±0.20	0.2 ~ 1mΩ	±50 ppm/°C
RS21	3921	5W	10.00±0.20	5.10±0.40	0.50±0.10	2.20±0.20		
RS31	5931	7W	15.00±0.30	7.60±0.40	0.50±0.10	4.20±0.30		

Type 类型	Size 规格	Power Rating 功率 70°C	Dimension(尺寸)(mm)								Resistance Range 阻值范围 ±1%	T.C.R. 温度系数
			L	W	H	R	S	T	U	N		
RS26	4026	3W	10.1±0.20	6.6+0.5/-0.2	3.0±0.20	5.2±0.20	0.7±0.10	0.4±0.10	2.0±0.10	1.0±0.15	0.5mΩ	±100ppm/°C

＊其他规格和阻值可特别提供

＊ Special size offered.

Performance Specifications (性能)

Short-time Overload	短时间过负荷	1% &2%: ±(1%+0.0005 Ω) 5%: ±(2%+0.0005 Ω)
Solderability	可焊性	Coverage must be over 95%.
Rapid change of temperature	温度快速变化	±(1.0%+0.0005 Ω)
Low Temperature Storage	低温放置	±(1%+0.0005 Ω)
High Temperature Exposure	高温放置	±(1%+0.0005 Ω)
Soldering heat	耐焊接热	±(1.0%+0.0005Ω)
Load life in humidity	湿度寿命	1% &2%: ±(1%+0.0005 Ω) 5%: ±(3%+0.0005 Ω)
Load life	负载寿命	1% &2%: ±(1%+0.0005 Ω) 5%: ±(3%+0.0005 Ω)

Ordering Procedure (Example: RS12 3W 1% 0.5mΩ T/R-1000)

订购方式 (例如: RS12 3W 1% 0.5mΩ T/R-1000)

R S 1 2 | 3 W | F | 5 0 0 P | T | 1 | E

Product Type (产品类型):
Fill-in 4 digits with the Chip resistor type as follow (填四位数表示产品类型):
RS12, RS21, RS31, RS26

Wattage (功率):
Fill-in 2 digits with the codes as follow (用下列代码填二位数):
W2 = 1/2W 1W=1W
1A=1.5W 2W =2W
3W=3W 5W=5W
7W=7W

Tolerance (公差):
F=±1% G = ±2% J=±5%

Resistance Value (阻值):
5% (E-24 series):
the 1st digit is "0", the 2nd & 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following;
5% 产品 (E-24 系列阻值):
第 1 位数是 0，第 2、3 位数表示阻值的有效数，第 4 位表示有几个 0;

1%(E-24, E-96 series):
the 1st to 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following.
1% 产品 (E-24, E-96 系列阻值):
第 1-3 位数表示阻值的有效数，第 4 位数表示有几个 0

Packing Qty.
(包装数量):
1=1000pcs
2=2000pcs
3=3000pcs
4=4000pcs
5=5000pcs

Special Feature (特征):
E = Lead Free (standard)
(无铅标准品)

Packing Type (包装类型):
T = T/R (编带 / 卷带)
B = Bulk in Poly bag (散装 / 袋装)

Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明 。

Automotive Thick Film Chip Resistors - CQ

汽车级晶片电阻器 - CQ系列

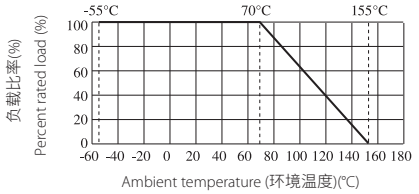
Feature (特性)

- Tolerance 精度为: ±0.5%~±5%
- Application automobile industry, comply with the relevant provisions of AEC-Q200.
  用于汽车，符合AEC-Q200相关条款。
- Anti-sulfurized performance 具有抗硫化性能：H_2S 3~5ppm, 50°C±2°C, 91%~93%RH, 1000H
- Resistance range 阻值范围: 1Ω~10MΩ,0 Ω
- Operating temperature range 工作温度范围: -55°C ~+155°C
- Stable electrical capability, high reliability 电性能稳定，可靠性高
- Suit for reflow & wave soldering 适合于回流焊或波峰焊接
- RoHS complaint 符合欧盟ROHS 标准

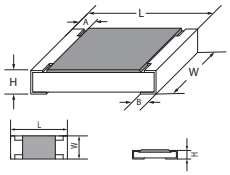
Application (应用)

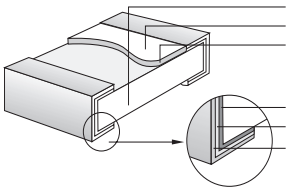
- Intelligent home appliances 智能家电产品
- High-end computer 电脑终端
- Medical equpment 医疗设备
- Industrial equpment 工业设备
- Outdoor electronic application 电子门禁

Derating Curve 降功率曲线



Figures (型状)





1. High purity Alumina substrate (高纯度氧化铝基板)
2. Protective coating (保护层)
3. Resistance element (阻抗元素)
4. Termination (Inner) Ni / Cr [端面(内)镍/铬层]
5. Termination (Between) Ni Barrier [端面(中)镍层]
6. Termination (Outer) Sn [端面(外)锡层(无铅)]

Dimension (尺寸) mm

TYype	L	W	H	A	B
CQ01 (0201)	0.60±0.03	0.30±0.03	0.23±0.03	0.12±0.05	0.15±0.05
CQ02 (0402)	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10
CQ03 (0603)	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20
CQ05 (0805)	2.00±0.15	$1.25^{+0.15}_{-0.10}$	0.55±0.10	0.40±020	0.40±0.20
CQ06 (1206)	3.10±0.15	$1.55^{+0.15}_{-0.10}$	0.55±0.10	0.45±020	0.45±0.20
CQ07 (1210)	3.10±0.10	2.60±0.20	0.55±0.10	0.50±0.25	0.50±0.20
CQ10 (2010)	5.00±0.10	2.50±0.20	0.55±0.10	0.60±0.25	0.50±0.20
CQ12 (2512)	6.35±0.10	3.20±0.20	0.55±0.10	0.60±0.25	0.50±0.20

Specification (性能)

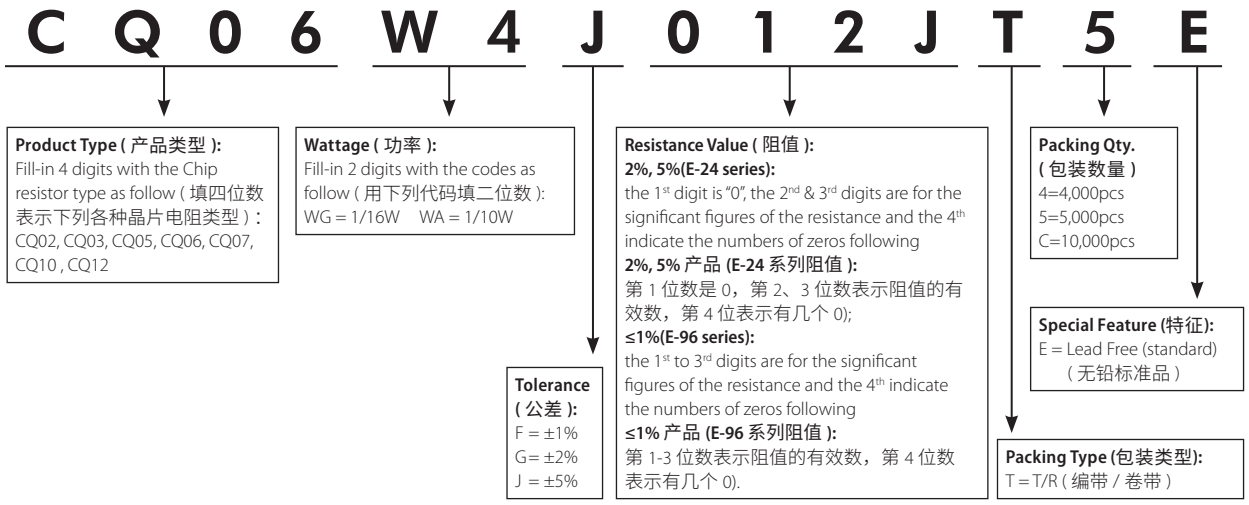
Type 类型	Power 功率 (70°C)	Tolerance 精度	Resistance Range 阻值范围	Max Working Voltage 最大工作电压	Max Overload Voltage 最大过负荷电压	Dielectric With-standing Voltage 绝缘耐压	Resistance Value of Jumper 零欧姆电阻阻值	Rated Current of Jumper 零欧姆电阻额定电流	Max. Current of Jumper 零欧姆电阻最大电流	Operating Temperature Range 工作温度范围
CQ01(0201)	1/20W	±0.5% ±1% ±2% ±5%	0 Ω 1Ω~10MΩ	25V	50V	/	<50mΩ	0.5A	1A	-55~+155°C
CQ02(0402)	1/16W			50V	100V	100V	<50mΩ	1A	2A	
CQ03(0603)	1/10W			75V	150V	300V	<50mΩ	1A	2A	
CQ05(0805)	1/8W			150V	300V	500V	<50mΩ	2A	5A	
CQ06(1206)	1/4W			200V	400V	500V	<50mΩ	2A	10A	
CQ07(1210)	1/2W			200V	500V	500V	<50mΩ	2A	10A	
CQ10(2010)	3/4W			200V	500V	500V	<50mΩ	2A	10A	
CQ12(2512)	1W			200V	500V	500V	<50mΩ	2A	10A	

Performance Specification (性能)

Test Item 试验项目	Reference standard 参考标准	Test Methods 试验方法	Evaluation Criteria 判定标准
Temperature Coefficient of Resistance 温度系数	**MIL-STD-202 Method 304**	Measure between: -55℃ ~+155℃ 测定范围：-55℃ ~+155℃	CQ01: 1Ω≤R≤10Ω: -100~+350ppm/℃ >10Ω: ±200ppm/℃ CQ02-CQ12: 1Ω≤R≤10Ω: ±200ppm/℃ >10Ω: ±100ppm/℃
Pre- and Post-Stress ElectricalTest (Short time Overload) 短時间过负荷	**AEC-Q200 TEST 1** **IEC60115 4.13**	2.5x Rated voltage or Max. Overload Voltage whichever is lower for 5 seconds, then check the resistance. 2.5 倍额定电压或最大过负荷电压 (取其低者), 持续 5 秒钟 , 然后测阻值。	±1%: ±(1.0%+0.05Ω) ±5%: ±(2.0%+0.05Ω)
Biased Humidity 偏置湿度	**AEC-Q200 TEST 7** **MIL-STD-202 Method 103**	1000 hours 85℃/85%RH. Note: Specified conditions:10% of operating power. Measurement at 24±4 hours after test conclusion. 在温度 85 ℃，湿度 85% 的条件下放置 1000 小时。 注意 : 指定条件 : 工作功率的 10%，试验结束后 24±4 小时内进行测试。	±1%: ±(1.0%+0.05Ω) ±5%: ±(3.0%+0.05Ω)
Operational Life 工作寿命	**AEC-Q200 TEST 8** **MIL-STD-202 Method 108**	1,000 hours at 125℃, applied de-rated (36%) power of continuous working voltage, 1.5 hours on, 0.5 hour off. 125℃ 下 36% 的额定功率 , 1.5 小时 ON, 0.5 小时 OFF, 1000H.	±1%: ±(1.0%+0.1Ω) ±5%: ±(3.0%+0.1Ω)
Resistance to Soldering Heat 耐焊接热	**AEC-Q200 TEST 15** **MIL-STD-202 Method 210**	Condition B No pre-heat of samples. Note: Single Wave Solder - Procedure 2 for SMD and Procedure 1 for Leaded with solder within 1.5mm of device body. 条件 B，样品不进行预热。注意 : 单一波峰焊 - 表面贴装元件按程序 2: 引脚产品按程序 1 进行焊接，浸入器件本体的 1.5mm 的深度	±(1.0%+0.05Ω)
Solderability 可焊性	**AEC-Q200 TEST 18** **J-STD-002**	SMD. Electrical test not required. Magnification 50 X. **Conditions:** 1. Baking 4 hours@155℃ dry heat, dipping @ 245±3℃ for 5±0.5 second. 2. Steam aging 8 hours, dipping @ 260±3℃ for 30±0.5 second. 表面贴装元件 , 不需要电气测试 . 放大倍数 50 倍 . **测试条件：** 1. 155℃ 干燥 4H 后 , 245℃ 5±0.5 秒浸锡 . 2. 8H 蒸汽后 , 260±3℃ 30±0.5 秒浸锡 .	Coverage must be over 95%.
Board Flex 弯曲	**AEC-Q200 TEST 21** **AEC-Q200-005**	Bending 3mm(CQ01-CQ05)/2mm(CQ06-CQ12)for 60±5sec 弯曲 3mm(CQ01-CQ05)/2mm(CQ06-CQ12) 保持 60±5 秒	±(1.0%+0.05Ω)
Sulfuration test 硫化测试		H_2S 3~5PPM 50℃±2℃ 91%~93% RH 1000H	±5%: ±(5.0%+0.05 Ω) ±1%: ±(1.0%+0.05 Ω)

Ordering Procedure (Example: CQ06 1/4W 5% 1.2 Ω T/R-5000)

订购方式 (例如: CQ06 1/4W 5% 1.2 Ω T/R-5000)



Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明 。

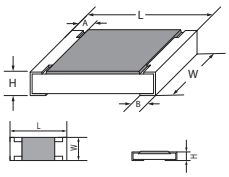
Automotive High Power Thick Film Chip Resistors - HQ

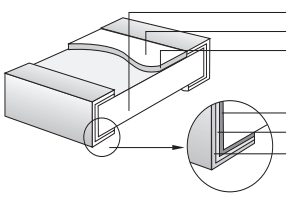
汽车级高功率晶片电阻器 - HQ系列

Feature (特性)

- Comply with the relevant provision of AEC-Q200
  符合AEC-Q200相关条款
- Suitable for reflow & wave soldering. 适合波峰焊与回流焊
- Application car. 适用于汽车

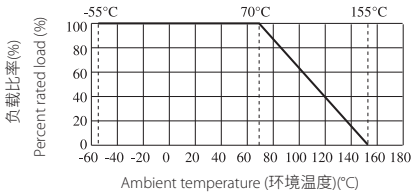
Figures (型状)





1. High purity Alumina substrate (高纯度氧化铝基板)
2. Protective coating (保护层)
3. Resistance element (阻抗元素)
4. Termination (Inner) Ni / Cr [端面(内)镍/铬层]
5. Termination (Between) Ni Barrier [端面(中)镍层]
6. Termination (Outer) Sn [端面(外)锡层(无铅)]

Derating Curve 降功率曲线



Specification (性能)

Type 类型	Max working voltage 最大工作电压	Max Overload Voltage 最大过负荷电压	Dielectric Withstanding Voltage 绝缘耐压	Resistance Value of Jumper 零欧姆电阻阻值	Rated Current Of Jumper 零欧姆电阻 额定电流	Max. Overload Current of Jumper 零欧姆电阻 最大过负荷电流	Operating Temperature 工作温度范围
HQ02	50V	100V	100V	< 50mΩ	1A	2A	-55~+155℃
HQ03	75V	150V	300V		1A	2A	
HQ05	150V	300V	500V		2A	5A	
HQ06	200V	400V	500V		2A	10A	
HQ07	200V	500V	500V		2A	10A	
HQ10	200V	500V	500V		2A	10A	
HQ12	250V	500V	500V		2A	10A	

Type 类型	Size 尺寸	Power 功率 (70°C)	L (mm)	W (mm)	H (mm)	A (mm)	B (mm)	Resistance Range 阻值范围 1%(E96), 5%(E24)
HQ02	0402 (1005)	1/10W	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10	1Ω~10M
HQ03	0603 (1608)	1/5W	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	
HQ05	0805 (2012)	1/3W	2.00±0.15	1.25 $^{+0.15}_{-0.10}$	0.55±0.10	0.40±0.20	0.40±0.20	
HQ06	1206 (3216)	1/2W	3.10±0.15	1.55 $^{+0.15}_{-0.10}$	0.55±0.10	0.45±0.20	0.45±0.20	
HQ07	1210 (3225)	3/4W	3.10±0.10	2.60±0.20	0.55±0.10	0.50±0.25	0.50±0.20	
HQ10	2010 (5025)	1W	5.00±0.10	2.50±0.20	0.55±0.10	0.60±0.25	0.50±0.20	
HQ12	2512 (6432)	2W	6.35±0.10	3.20±0.20	0.55±0.10	0.60±0.25	0.50±0.20	

*Special offers 特别提供：HQ12 B:1.80±0.25mm

Performance Specification (性能)

Test Item 试验项目	Reference standard 参考标准	Test Methods 试验方法	Evaluation Criteria 判定标准
Temperature Coefficient of Resistance 温度系数	**MIL-STD-202 Method 304**	Measure between: -55°C ~+155°C 测定范围：-55°C ~+155°C	1Ω≤R≤10Ω:±200ppm/°C 10Ω<R≤10MΩ:±100ppm/°C
Pre- and Post-Stress ElectricalTest (Short time Overload) 短時间过负荷	**AEC-Q200 TEST 1** **IEC60115 4.13**	2.5x Rated voltage or Max. Overload Voltage whichever is lower for 5 seconds, then check the resistance. 2.5 倍额定电压或最大过负荷电压 (取其低者), 持续 5 秒钟 , 然后测阻值。	±1%: ±(1.0%+0.05Ω) ±5%: ±(2.0%+0.05Ω)
Biased Humidity 偏置湿度	**AEC-Q200 TEST 7** **MIL-STD-202 Method 103**	1000 hours 85°C/85%RH. Note: Specified conditions:10% of operating power. Measurement at 24±4 hours after test conclusion. 在温度 85 °C，湿度 85% 的条件下放置 1000 小时。 注意 : 指定条件 : 工作功率的 10%，试验结束后 24±4 小时内进行测试。	±1%: ±(1.0%+0.05Ω) ±5%: ±(3.0%+0.05Ω)
Operational Life 工作寿命	**AEC-Q200 TEST 8** **MIL-STD-202 Method 108**	1,000 hours at 125°C, applied de-rated (36%) power of continuous working voltage, 1.5 hours on, 0.5 hour off. 125°C 下 36% 的额定功率 , 1.5 小时 ON, 0.5 小时 OFF, 1000H.	±1%: ±(1.0%+0.1Ω) ±5%: ±(3.0%+0.1Ω)
Resistance to Soldering Heat 耐焊接热	**AEC-Q200 TEST 15** **MIL-STD-202 Method 210**	Condition B No pre-heat of samples. Note: Single Wave Solder - Procedure 2 for SMD and Procedure 1 for Leaded with solder within 1.5mm of device body. 条件 B，样品不进行预热。注意 : 单一波峰焊 - 表面贴装元件按程序 2: 引脚产品按程序 1 进行焊接，浸入器件本体的 1.5mm 的深度	±(1.0%+0.05Ω)
Solderability 可焊性	**AEC-Q200 TEST 18** **J-STD-002**	SMD. Electrical test not required. Magnification 50 X. **Conditions:** 1. Baking 4 hours@155°C dry heat, dipping @ 245±3°C for 5±0.5 second. 2. Steam aging 8 hours, dipping @ 260±3°C for 30±0.5 second. 表面贴装元件 , 不需要电气测试 . 放大倍数 50 倍 . **测试条件 :** 1.155°C 干燥 4H 后 , 245 °C 5±0.5 秒浸锡 . 2.8H 蒸汽后 , 260±3°C 30±0.5 秒浸锡 .	Coverage must be over 95%.
Board Flex 弯曲	**AEC-Q200 TEST 21** **AEC-Q200-005**	Bending 3mm(HQ02-HQ05)/2mm(HQ06-HQ12)for 60±5sec 弯曲 3mm(HQ02-HQ05)/2mm(HQ06-HQ12) 保持 60±5 秒	±(1.0%+0.05Ω)
Sulfuration test 硫化测试		H_2S 3~5PPM 50°C±2°C 91%~93% RH 1000H	±5%: ±(5.0%+0.1 Ω) ±1%: ±(1.0%+0.1 Ω)

Ordering Procedure (Example: HQ06 1/4W 5% 1.2 Ω T/R-5000)

订购方式 (例如: HQ06 1/4W 5% 1.2 Ω T/R-5000)

H Q 0 6 W 4 J 0 1 2 J T 5 E

Product Type (产品类型):
Fill-in 4 digits with the Chip resistor type as follow (填四位数表示下列各种晶片电阻类型):
HQ02, HQ03, HQ05, HQ06, HQ07, HQ10 , HQ12

Wattage (功率):
Fill-in 2 digits with the codes as follow (用下列代码填二位数):
WG = 1/16W
WA = 1/10W
W8 = 1/8W
W4 = 1/4W
W3 = 1/3W
W2 = 1/2W
07 = 3/4W
1W=1W

Tolerance (公差):
F = ±1%
G = ±2%
J = ±5%

Resistance Value (阻值):
2%, 5%(E-24 series):
the 1st digit is "0", the 2nd & 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following
2%, 5% 产品 (E-24 系列阻值):
第 1 位数是 0，第 2、3 位数表示阻值的有效数，第 4 位表示有几个 0);
≤1%(E-96 series):
the 1st to 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following
≤1% 产品 (E-96 系列阻值):
第 1-3 位数表示阻值的有效数，第 4 位数表示有几个 0).

Packing Qty. (包装数量)
4=4,000pcs
5=5,000pcs
C=10,000pcs

Special Feature (特征):
E = Lead Free (standard)
(无铅标准品)

Packing Type (包装类型):
T = T/R (编带 / 卷带)

Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明 。

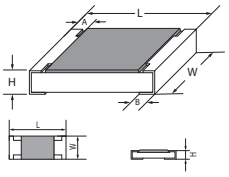
Automotive Low Resistance Thick Film Chip resistor -CS

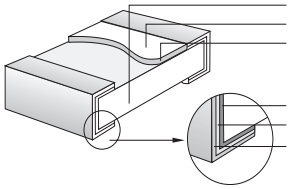
汽车级低阻厚膜晶片电阻-CS系列

Feature (特性)

- Ultra-low Value
  超低阻值
- Low Temperature Coefficient
  低温度系数
- Suitable for reflow & wave soldering
  适合波峰焊及回流焊
- Application: Power supply
  应用于电源

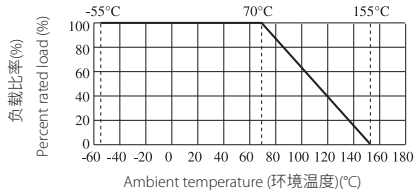
Figures (型状)





1. High purity Alumina substrate (高纯度氧化铝基板)
2. Protective coating (保护层)
3. Resistance element (阻抗元素)
4. Termination (Inner) Ni / Cr [端面(内)镍/铬层]
5. Termination (Between) Ni Barrier [端面(中)镍层]
6. Termination (Outer) Sn [端面(外)锡层(无铅)]

Derating Curve & Specification (降功率曲线及性能)



Type 类型	Dielectirc Withstanding Voltage 绝缘耐压	Operating Temperature 工作温度范围
CS02	100V	-55℃~155℃
CS03	300V	-55℃~155℃
CS05	500V	-55℃~155℃
CS06	500V	-55℃~155℃
CS07	500V	-55℃~155℃
CS10	500V	-55℃~155℃
CS11	500V	-55℃~155℃
CS12	500V	-55℃~155℃

Type 类型	Size 尺寸	Power Rating 功率 70°C	L(mm)	W(mm)	H(mm)	A(mm)	B(mm)	Resistance Range 阻值范围 1% & 5%	T.C.R. 温度系数
CS02	0402 (1005)	1/8W	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10	50mΩ~1Ω	50mΩ≤R<100mΩ: ±700 ppm/°C 100mΩ≤R≤1Ω: ±200 ppm/°C
CS03	0603 (1608)	1/5W	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	10mΩ~1Ω	10mΩ≤R<15mΩ: ±1500ppm/°C 15mΩ ≤R<20mΩ: ±1000ppm/°C 20mΩ≤R<30mΩ: ±800 ppm/°C 30mΩ≤R<33mΩ: ±600 ppm/°C 33mΩ≤R≤50mΩ: ±400 ppm/°C 50mΩ<R≤0.1Ω: ±300 ppm/°C 0.1Ω<R≤1Ω: ±200 ppm/°C
CS05	0805 (2012)	1/4W	2.00±0.15	1.25 +0.15 -0.10	0.55±0.10	0.40±0.20	0.40±0.20	10mΩ~1Ω	10mΩ≤R≤15mΩ: ±800 ppm/°C 15mΩ<R≤25mΩ: ±600 ppm/°C 25mΩ<R≤50mΩ: ±400 ppm/°C 50mΩ<R≤0.2Ω: ±200 ppm/°C 0.2Ω<R≤1Ω: ±100 ppm/°C
CS06	1206 (3216)	1/3W	3.10±0.15	1.55 +0.15 -0.10	0.55±0.10	0.45±0.20	0.45±0.20	10mΩ~1Ω	10mΩ≤R<15mΩ: ±700ppm/°C 15mΩ≤R≤30mΩ: ±400ppm/°C 30mΩ<R≤50mΩ: ±300ppm/°C 50mΩ<R≤0.1Ω: ±200ppm/°C 0.1Ω<R≤1Ω: ±150ppm/°C
CS07	1210 (3225)	1/2W	3.10±0.10	2.60±0.20	0.55±0.10	0.50±0.25	0.50±0.20	10mΩ~1Ω	10mΩ≤R<15mΩ: ±500ppm/°C 15mΩ≤R<20mΩ: ±400ppm/°C 20mΩ≤R≤50mΩ: ±300ppm/°C 50mΩ<R≤1Ω: ±100ppm/°C
CS10	2010 (5025)	3/4W	5.00±0.10	2.50±0.20	0.55±0.10	0.60±0.25	0.50±0.20	10mΩ~1Ω	10mΩ≤R<15mΩ: ±600ppm/°C 15mΩ≤R<20mΩ: ±500ppm/°C 20mΩ≤R≤30mΩ: ±300ppm/°C 30mΩ<R≤50mΩ: ±200ppm/°C 50mΩ<R≤0.1Ω: ±150ppm/°C 0.1Ω<R≤1Ω: ±100ppm/°C
CS11	1812 (4532)	3/4W	4.50±0.20	3.20±0.20	0.55±0.20	0.50±0.20	0.80±0.30	10mΩ~1Ω	10mΩ≤R<20mΩ: ±500ppm/°C 20mΩ≤R<50mΩ: ±400ppm/°C 50mΩ≤R≤0.1Ω: ±200ppm/°C 0.1Ω<R≤1Ω: ±100ppm/°C
CS12	2512 (6432)	1W	6.35±0.10	3.20±0.20	0.55±0.10	0.60±0.25	0.80±0.30	10mΩ~1Ω	10mΩ≤R<15mΩ: ±600ppm/°C 15mΩ≤R<20mΩ: ±400ppm/°C 20mΩ≤R≤30mΩ: ±300ppm/°C 30mΩ<R≤50mΩ: ±200ppm/°C 50mΩ<R≤0.1Ω: ±150ppm/°C 0.1Ω<R≤1Ω: ±100ppm/°C

Performance Specifications (性能)

Test Item 试验项目	Reference standard 参考标准	Test Methods 试验方法	Evaluation Criteria 判定标准
Pre- and Post-Stress ElectricalTest (Short time Overload) 短時间过负荷	**AEC-Q200 TEST 1** **IEC60115 4.13**	2.5x Rated voltage or Max. Overload Voltage whichever is lower for 5 seconds, then check the resistance. 2.5 倍额定电压或最大过负荷电压 (取其低者), 持续 5 秒钟 , 然后测阻值。	±1%: ±(1.0%+0.05Ω) ±5%: ±(2.0%+0.05Ω)
Biased Humidity 偏置湿度	**AEC-Q200 TEST 7** **MIL-STD-202 Method 103**	1000 hours 85°C/85%RH. Note: Specified conditions:10% of operating power. Measurement at 24±4 hours after test conclusion. 在温度 85 °C，湿度 85% 的条件下放置 1000 小时。 注意 : 指定条件 : 工作功率的 10%，试验结束后 24±4 小时内进行测试。	±1%: ±(1.0%+0.05Ω) ±5%: ±(3.0%+0.05Ω)
Operational Life 工作寿命	**AEC-Q200 TEST 8** **MIL-STD-202 Method 108**	1,000 hours at 125°C, applied de-rated (36%) power of continuous working voltage, 1.5 hours on, 0.5 hour off. 125°C 下 36% 的额定功率 , 1.5 小时 ON, 0.5 小时 OFF, 1000H.	±1%: ±(1.0%+0.1Ω) ±5%: ±(3.0%+0.1Ω)
Resistance to Soldering Heat 耐焊接热	**AEC-Q200 TEST 15** **MIL-STD-202 Method 210**	Condition B No pre-heat of samples. Note: Single Wave Solder - Procedure 2 for SMD and Procedure 1 for Leaded with solder within 1.5mm of device body. 条件 B，样品不进行预热。注意 : 单一波峰焊 - 表面贴装元件按程序 2: 引脚产品按程序 1 进行焊接，浸入器件本体的 1.5mm 的深度	±(1.0%+0.05Ω)
Solderability 可焊性	**AEC-Q200 TEST 18** **J-STD-002**	SMD. Electrical test not required. Magnification 50 X. **Conditions:** 1. Baking 4 hours@155°C dry heat, dipping @ 245±3°C for 5±0.5 second. 2. Steam aging 8 hours, dipping @ 260±3°C for 30±0.5 second. 表面贴装元件 , 不需要电气测试 . 放大倍数 50 倍 . **测试条件 :** 1. 155°C 干燥 4H 后 , 245°C 5±0.5 秒浸锡 . 2. 8H 蒸汽后 , 260±3°C 30±0.5 秒浸锡 .	Coverage must be over 95%.
Board Flex 弯曲	**AEC-Q200 TEST 21** **AEC-Q200-005**	Bending 3mm(CS02-CS05)/2mm(CS06-CS12)for 60±5sec 弯曲 3mm(CS02-CS05)/2mm(CS06-CS12) 保持 60±5 秒	±(1.0%+0.05Ω)

* CS07 size in 0.75W 0.1~1Ω 100PPM/°C could be provided specially (* CS07 0.75W 0.1~1Ω 100PPM/°C 可特别提供)

Ordering Procedure (Example: CS12 1W 5% 22mΩ T/R-4000)

订购方式 (例如: CS12 1W 5% 22mΩ T/R-4000)

C S 1 2 1 W J 0 2 2 L T 4 E

Product Type (产品类型):
Fill-in 4 digits with the Chip resistor type as follow (填四位数表示产品类型):
CS02, CS03, CS05, CS06, CS07, CS10, CS11, CS12

Wattage (功率):
Fill-in 2 digits with the codes as follow (用下列代码填二位数):
WA=1/10W W8=1/8W
W4=1/4W W5=1/5W
W3=1/3W W2=1/2W
07 = 3/4W 1W=1W

Tolerance (公差):
F = ±1%
J = ±5%

Resistance Value (阻值):
5% (E-24 series):
the 1st digit is "0", the 2nd & 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following;
5% 产品 (E-24 系列阻值):
第 1 位数是 0，第 2、3 位数表示阻值的有效数，第 4 位表示有几个 0;

1%(E-24, E-96 series):
the 1st to 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following.
1% 产品 (E-24, E-96 系列阻值):
第 1-3 位数表示阻值的有效数，第 4 位数表示有几个 0

Packing Qty. (包装数量):
4=4,000pcs,
5=5,000pcs
C=10,000pcs
D=20,000pcs

Special Feature (特征):
E = Lead Free (standard)
(无铅标准品)

Packing Type (包装类型):
T = T/R
(编带 / 卷带)
B = Bulk in Poly bag
(散装 / 袋装)
C = Bulk in cassette
(散装 / 盒装)

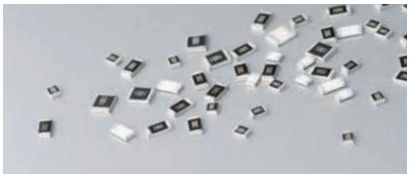
Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明 。

Anti-Sulfurized Automotive Thick Film Chip Resistors - NQ

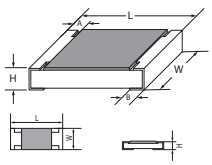
抗硫化汽车级晶片电阻器 - NQ系列

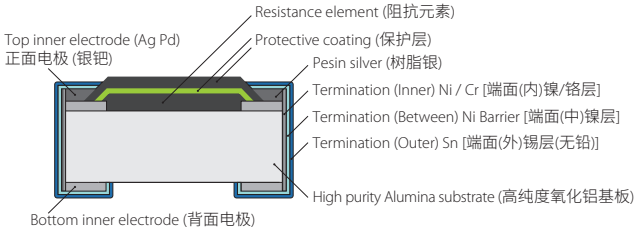
Feature (特性)

- Exellent Anti-Sulfurized 卓越的抗硫化
- AEC-Q200 qualifed 符合 AEC-Q200 相关条款
- Suitable for reflow & wave soldering 适合波峰焊和回流焊
- RoHS complaint 符合欧盟 ROHS 标准

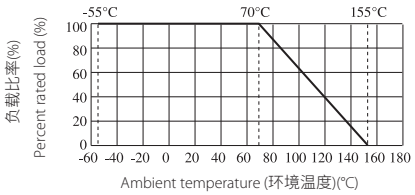


Figures (型状)





Derating Curve (降功率曲线)



Specification (性能)

Type 类型	Size 尺寸	Max Working Voltage 最大工作电压	Max Overload Voltage 最大过负荷电压	Dielectric Withstanding Voltage 绝缘耐压	Resistance Value of Jumper 零欧姆电阻阻值	Rated Current of Jumper 零欧姆电阻 额定电流	Max. Overload Current of Jumper 零欧姆电阻 最大过负荷电流	Operating Temperature 工作温度范围
NQ01	0201 (0603)	25V	50V	/	<50mΩ	0.5A	1A	-55~+155°C
NQ02	0402 (1005)	50V	100V	100V	<50mΩ	1A	2A	
NQ03	0603 (1608)	75V	150V	300V	<50mΩ	1A	2A	
NQ05	0805 (2012)	150V	300V	500V	<50mΩ	2A	5A	
NQ06	1206 (3216)	200V	400V	500V	<50mΩ	2A	10A	
NQ07	1210 (3225)	200V	500V	500V	<50mΩ	2A	10A	
NQ10	2010 (5025)	200V	500V	500V	<50mΩ	2A	10A	
NQ12	2512 (6432)	200V	500V	500V	<50mΩ	2A	10A	

Type 类型	Size 尺寸	Power 功率 (70°C)	L (mm)	W (mm)	H (mm)	A (mm)	B (mm)	Resistance Range 阻值范围 1%(E96), 5%(E24)
NQ01	0201 (0603)	1/20W	0.60±0.03	0.30±0.03	0.23±0.03	0.12±0.05	0.15±0.05	1Ω~10M 0Ω
NQ02	0402 (1005)	1/16W	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10	
NQ03	0603 (1608)	1/10W	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	
NQ05	0805 (2012)	1/8W	2.00±0.15	1.25 $^{+0.15}_{-0.10}$	0.55±0.10	0.40±0.20	0.40±0.20	
NQ06	1206 (3216)	1/4W	3.10±0.15	1.55 $^{+0.15}_{-0.10}$	0.55±0.10	0.45±0.20	0.45±0.20	
NQ07	1210 (3225)	1/2W	3.10±0.10	2.60±0.20	0.55±0.10	0.50±0.25	0.50±0.20	
NQ10	2010 (5025)	3/4W	5.00±0.10	2.50±0.20	0.55±0.10	0.60±0.25	0.50±0.20	
NQ12	2512 (6432)	1W	6.35±0.10	3.20±0.20	0.55±0.10	0.60±0.25	0.50±0.20	

Performance Specification (性能)

Test Item 试验项目	Reference standard 参考标准	Test Methods 试验方法	Evaluation Criteria 判定标准
Temperature Coefficient of Resistance 温度系数	**MIL-STD-202 Method 304**	Measure between: -55℃ ~+155℃ 测定范围：-55℃ ~+155℃	NQ01: 1Ω≤R≤10Ω: -100~+350ppm/℃ >10Ω: ±200ppm/℃ NQ02-NQ12: 1Ω≤R≤10Ω: ±200ppm/℃ >10Ω: ±100ppm/℃
Pre- and Post-Stress ElectricalTest (Short time Overload) 短时间过负荷	**AEC-Q200 TEST 1** **IEC60115 4.13**	2.5x Rated voltage or Max. Overload Voltage whichever is lower for 5 seconds, then check the resistance. 2.5 倍额定电压或最大过负荷电压 (取其低者), 持续 5 秒钟 , 然后测阻值。	±1%: ±(1.0%+0.05Ω) ±5%: ±(2.0%+0.05Ω)
Biased Humidity 偏置湿度	**AEC-Q200 TEST 7** **MIL-STD-202 Method 103**	1000 hours 85℃/85%RH. Note: Specified conditions:10% of operating power. Measurement at 24±4 hours after test conclusion. 在温度 85 ℃，湿度 85% 的条件下放置 1000 小时。 注意 : 指定条件 : 工作功率的 10%，试验结束后 24±4 小时内进行测试。	±1%: ±(1.0%+0.05Ω) ±5%: ±(3.0%+0.05Ω)
Operational Life 工作寿命	**AEC-Q200 TEST 8** **MIL-STD-202 Method 108**	1,000 hours at 125℃, applied de-rated (36%) power of continuous working voltage, 1.5 hours on, 0.5 hour off. 125℃ 下 36% 的额定功率 , 1.5 小时 ON, 0.5 小时 OFF, 1000H.	±1%: ±(1.0%+0.1Ω) ±5%: ±(3.0%+0.1Ω)
Resistance to Soldering Heat 耐焊接热	**AEC-Q200 TEST 15** **MIL-STD-202 Method 210**	Condition B No pre-heat of samples. Note: Single Wave Solder - Procedure 2 for SMD and Procedure 1 for Leaded with solder within 1.5mm of device body. 条件 B，样品不进行预热。注意 : 单一波峰焊 - 表面贴装元件按程序 2: 引脚产品按程序 1 进行焊接，浸入器件本体的 1.5mm 的深度	±(1.0%+0.05Ω)
Solderability 可焊性	**AEC-Q200 TEST 18** **J-STD-002**	SMD. Electrical test not required. Magnification 50 X. **Conditions:** 1. Baking 4 hours@155℃ dry heat, dipping @ 245±3℃ for 5±0.5 second. 2. Steam aging 8 hours, dipping @ 260±3℃ for 30±0.5 second. 表面贴装元件 , 不需要电气测试 . 放大倍数 50 倍 . **测试条件 :** 1. 155℃ 干噪 4H 后 , 245℃ 5±0.5 秒浸锡 . 2. 8H 蒸汽后 , 260±3℃ 30±0.5 秒浸锡 .	Coverage must be over 95%. 覆盖率≥ 95%
Board Flex 弯曲	**AEC-Q200 TEST 21** **AEC-Q200-005**	Bending 3mm(NQ01-NQ05)/2mm(NQ06-NQ12)for 60±5sec 弯曲 3mm(NQ01-NQ05)/2mm(NQ06-HQ12) 保持 60±5 秒	±(1.0%+0.05Ω)
Sulfuration test 硫化测试		Soaked in industrial oil with sulfur substance 3.5% contained 105℃ ±3℃ 500h 工业用油含硫磺成份 3.5%，105℃±3℃, 500H	ΔR≤±(5%+0.05Ω)

Ordering Procedure (Example: NQ06 1/4W 5% 1.2 Ω T/R-5000)

订购方式 (例如: NQ06 1/4W 5% 1.2 Ω T/R-5000)

N Q 0 6 W 4 J 0 1 2 J T 5 E

Product Type (产品类型):
Fill-in 4 digits with the Chip resistor type as follow (填四位数表示产品类型) :
NQ01, NQ02, NQ03, NQ05, NQ06, NQ07, NQ10, NQ12

Wattage (功率):
Fill-in 2 digits with the codes as follow (用下列代码填二位数):
WM=1/20W WG=1/16W
WA=1/10W W8=1/8W
W4=1/4W W3=1/3W
W2=1/2W 1W=1W

Tolerance (公差):
F=±1%
J=±5%

Resistance Value (阻值):
5% (E-24 series) :
the 1st digit is "0", the 2nd & 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following
5% 产品 (E-24 系列阻值):
第 1 位数是 0，第 2、3 位数表示阻值的有效数，第 4 位表示有几个 0);
1%(E-96 series):
the 1st to 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following
1% 产品 (E-96 系列阻值):
第 1-3 位数表示阻值的有效数，第 4 位数表示有几个 0).

Packing Qty. (包装数量)
4=4,000pcs
5=5,000pcs
C=10,000pcs
E=15,000pcs

Special Feature (特征):
E = Lead Free (standard)
(无铅标准品)

Packing Type (包装类型):
T=TB=Bulk /R(编带 / 卷带)

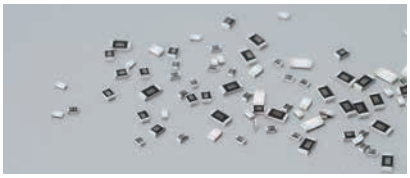
Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明 。

High Quality Anti-Sulfurized Automotive Thick Film Chip Resistors-NS

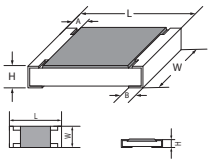
高品质抗硫化汽车级晶片电阻器 - NS系列

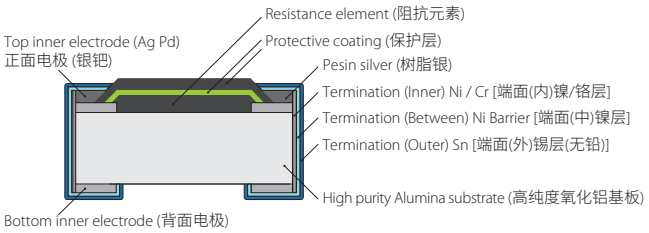
Feature (特性)

- Superior Anti-Sulfurized 优越的抗硫化
- Superior Anti-Surge Voltage performance 优越的抗浪涌电压特性
- Suitable for reflow & wave soldering 适合波峰焊与回流焊
- Application automobile industry, comply with the relevant provisions of AEC-Q200, 100% power rating under +125°C
  用于汽车，符合 AEC-Q200 相关条款，+125° 温度下 100% 功率使用

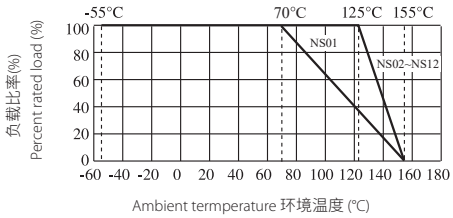


Figures (型状)

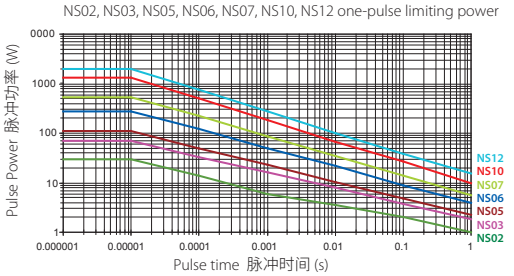




Derating Curve (降功率曲线)



Curve of Pulse Duration (脉冲曲线)



Specification (性能)

Type 类型	Size 尺寸	Max working voltage 最大工作电压	Max Overload Voltage 最大过负荷电压	Dielectric Withstanding Voltage 绝缘耐压	Resistance Value of Jumper 零欧姆电阻阻值	Rated Current of Jumper 零欧姆电阻 额定电流	Max. Overload Current of Jumper 零欧姆电阻 最大过负荷电流	Operating Temperature 工作温度范围
NS01	0201 (0603)	25V	50V	/	< 50mΩ	0.5A	1A	-55~+155℃
NS02	0402 (1005)	50V	100V	100V	< 50mΩ	1A	2A	
NS03	0603 (1608)	75V	150V	300V	< 50mΩ	1A	2A	
NS05	0805 (2012)	150V	300V	500V	< 50mΩ	2A	5A	
NS06	1206 (3216)	200V	400V	500V	< 50mΩ	2A	10A	
NS07	1210 (3225)	200V	500V	500V	< 50mΩ	2A	10A	
NS10	2010 (5025)	200V	500V	500V	< 50mΩ	2A	10A	
NS12	2512 (6432)	200V	500V	500V	< 50mΩ	2A	10A	

Type 类型	Power 功率	L (mm)	W (mm)	H (mm)	A (mm)	B (mm)	Resistance Range 阻值范围 1%(E96), 5%(E24)
NS01	1/20W	0.60±0.03	0.30±0.03	0.23±0.03	0.12±0.05	0.15±0.05	1Ω~10M 0Ω
NS02	1/16W	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10	
NS03	1/10W	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	
NS05	1/8W	2.00±0.15	$1.25^{+0.15}_{-0.10}$	0.55±0.10	0.40±0.20	0.40±0.20	
NS06	1/4W	3.10±0.15	$1.55^{+0.15}_{-0.10}$	0.55±0.10	0.45±0.20	0.45±0.20	
NS07	1/3W	3.10±0.10	2.60±0.20	0.55±0.10	0.50±0.25	0.50±0.20	
NS10	3/4W	5.00±0.10	2.50±0.20	0.55±0.10	0.60±0.25	0.50±0.20	
NS12	1W	6.35±0.10	3.20±0.20	0.55±0.10	0.60±0.25	0.50±0.20	

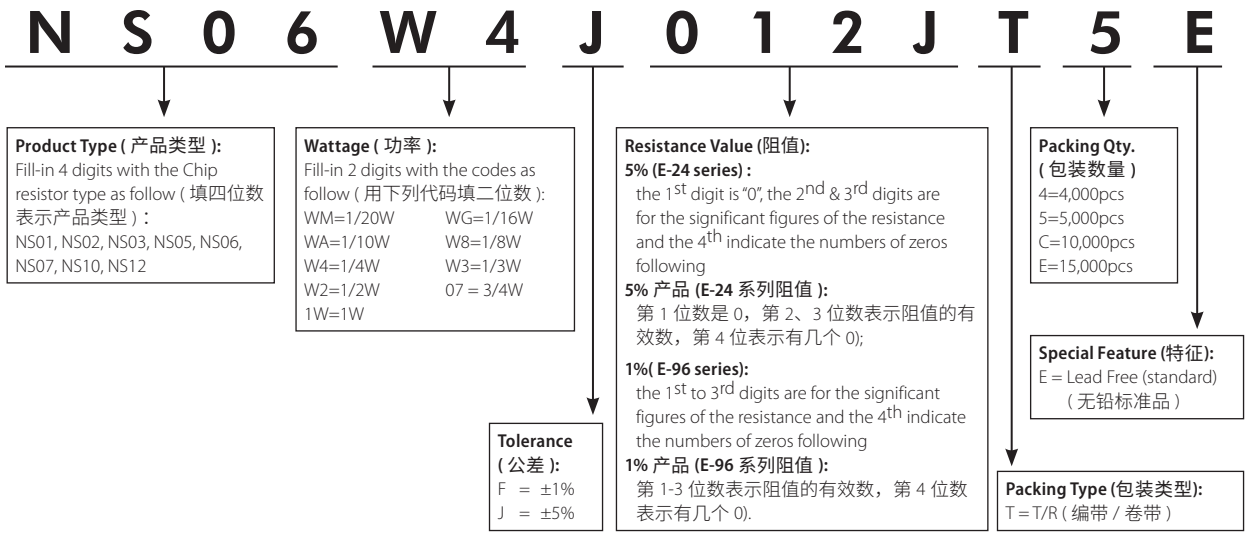
* Special offered 特别提供 : NS12 B:1.80±0.25mm

Performance Specification (性能)

Test Item 试验项目	Reference standard 参考标准	Test Methods 试验方法	Evaluation Criteria 判定标准
Temperature Coefficient of Resistance 温度系数	**MIL-STD-202 Method 304**	Measure between: -55℃ ~+155℃ 测定范围：-55℃ ~+155℃	NS01: 1Ω≤R≤10Ω: -100~+350ppm/℃ >10Ω: ±200ppm/℃ NS02-NS12: 1Ω≤R≤10Ω: ±200ppm/℃ >10Ω: ±100ppm/℃
Pre- and Post-Stress ElectricalTest (Short time Overload) 短时间过负荷	**AEC-Q200 TEST 1** **IEC60115 4.13**	2.5x Rated voltage or Max. Overload Voltage whichever is lower for 5 seconds, then check the resistance. 2.5 倍额定电压或最大过负荷电压 (取其低者), 持续 5 秒钟 , 然后测阻值。	±1%: ±(1.0%+0.05Ω) ±5%: ±(2.0%+0.05Ω)
Biased Humidity 偏置湿度	**AEC-Q200 TEST 7** **MIL-STD-202 Method 103**	1000 hours 85℃/85%RH. Note: Specified conditions:10% of operating power. Measurement at 24±4 hours after test conclusion. 在温度 85 ℃，湿度 85% 的条件下放置 1000 小时。 注意 : 指定条件 : 工作功率的 10%，试验结束后 24±4 小时内进行测试。	±1%: ±(1.0%+0.05Ω) ±5%: ±(3.0%+0.05Ω)
Operational Life 工作寿命	**AEC-Q200 TEST 8** **MIL-STD-202 Method 108**	Condition D Steady State TA=125℃ at rated power.Measurement at 24±4 hours after test conclusion. 条件 D，稳定状态 TA=125℃，额定功率。实验结束后 24±4 小时内进行测试。	±1%: ±(1.0%+0.1Ω) ±5%: ±(3.0%+0.1Ω)
Resistance to Soldering Heat 耐焊接热	**AEC-Q200 TEST 15** **MIL-STD-202 Method 210**	Condition B No pre-heat of samples. Note: Single Wave Solder - Procedure 2 for SMD and Procedure 1 for Leaded with solder within 1.5mm of device body. 条件 B，样品不进行预热。注意 : 单一波峰焊 - 表面贴装元件按程序 2: 引脚产品按程序 1 进行焊接，浸入器件本体的 1.5mm 的深度	±(1.0%+0.05Ω)
Solderability 可焊性	**AEC-Q200 TEST 18** **J-STD-002**	SMD. Electrical test not required. Magnification 50 X. **Conditions:** 1. Baking 4 hours@155℃ dry heat, dipping @ 245±3℃ for 5±0.5 second. 2. Steam aging 8 hours, dipping @ 260±3℃ for 30±0.5 second. 表面贴装元件 , 不需要电气测试 . 放大倍数 50 倍 . **测试条件 :** 1.155℃ 干燥 4H 后 , 245℃ 5±0.5 秒浸锡 . 2.8H 蒸汽后 , 260±3℃ 30±0.5 秒浸锡 .	Coverage must be over 95%.
Board Flex 弯曲	**AEC-Q200 TEST 21** **AEC-Q200-005**	Bending 3mm(NS01-NS05)/2mm(NS06-NS12)for 60±5sec 弯曲 3mm(NS01-NS05)/2mm(NS06-NS12) 保持 60±5 秒	±(1.0%+0.05Ω)
Sulfuration test 硫化测试		Soaked in industrial oil with sulfur substance 3.5% contained 105℃ ±3℃ 500h 工业用油含硫磺成份 3.5%，105℃±3℃, 500H	ΔR≤±(5%+0.05Ω)

Ordering Procedure (Example: NS06 1/4W 5% 1.2 Ω T/R-5000)

订购方式 (例如: NS06 1/4W 5% 1.2 Ω T/R-5000)



Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明。

Anti-Sulfurized Thick Film Chip Resistor Array-Convex Terminal

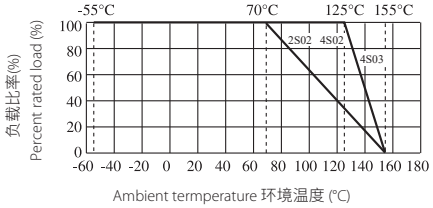
抗硫化厚膜晶片排列电阻器

www.royalohm.com

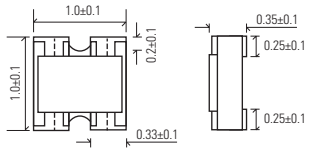
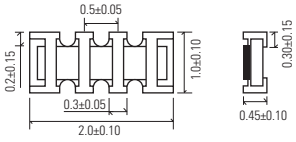
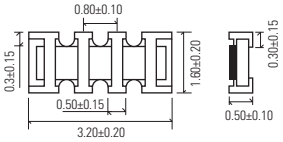
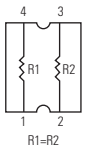
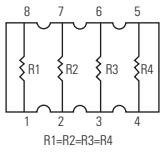
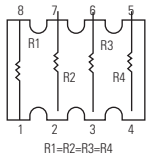
Feature (特性)

- Anti-Sulfidation 抗硫化
- Suitable for reflow & wave soldering 适合波峰焊与回流焊
- Application car, power 适用于汽车、电源等

Derating Curve (降功率曲线)



Dimension (mm) & Conformation [尺寸(mm)与结构]

Type 类型	2S02	4S02	4S03
Size 尺寸	0402×2	0402×4	0603×4
Dimension 规格 (mm)			
Equivalent Circuit Diagram 等效电路图			

Characteristics (特性)

Type 类型	Power Rating 功率	Max. Working Voltage 最大工作电压	Max. Overload Voltage 最大过负荷电压	Resistance Range 阻值范围	Dielectric Withstanding Voltage 绝缘耐压	Tolerance 公差	Operating Temperature 工作温度范围	Resistance Value of Jumper 零欧姆电阻阻值	Rated Current of Jumper 零欧姆电阻额定电流	T.C.R 温度系数 (PPM/°C)
2S02	1/16W	50V	100V	10Ω~1MΩ	100	±1%, ±5%	-55°C~+155°C	<50mΩ	1A	±200
4S02				10Ω~1MΩ	100					±200
4S03				1Ω ~1MΩ	300					≥10Ω:±200 <10Ω:±400

Performance Specification (性能)

Test Item 试验项目	Reference standard 参考标准	Test Methods 试验方法	Evaluation Criteria 判定标准
Temperature Coefficient of Resistance 温度系数	**MIL-STD-202 Method 304**	Measure between -55℃ ~+155℃ 测定范围：-55° C ~+155℃	1Ω ≤ R ≤ 10Ω:±200ppm/℃ 10Ω<R ≤ 10MΩ:±100ppm/℃
Pre- and Post-Stress ElectricalTest (Short time Overload) 短時間過負荷	**AEC-Q200 TEST 1** **IEC60115 4.13**	2.5x Rated voltage or Max. Overload Voltage whichever is lower for 5 seconds, then check the resistance. 2.5 倍额定电压或最大过负荷电压 (取其低者), 持续 5 秒钟 , 然后测阻值。	±1%: ±(1.0%+0.05Ω) ±5%: ±(2.0%+0.05Ω)
Biased Humidity 偏置湿度	**AEC-Q200 TEST 7** **MIL-STD-202 Method 103**	1000 hours 85℃/85%RH. Note: Specified conditions:10% of operating power.Measurement at 24±4 hours after test conclusion. 在温度 85℃，湿度 85% 的条件下放置 1000 小时。注意 : 指定条件 : 工作功率的 10%，试验结束后 24±4 小时内进行测试。	±1%: ±(1.0%+0.05Ω) ±5%: ±(3.0%+0.05Ω)
Operational Life 工作寿命	**AEC-Q200 TEST 8** **MIL-STD-202 Method 108**	Condition D Steady State TA=125℃ at rated power.Measurement at 24±4 hours after test conclusion. 条件 D，稳定状态 TA=125℃，额定功率。实验结束后 24±4 小时内进行测试。	±1%: ±(1.0%+0.1Ω) ±5%: ±(3.0%+0.1Ω)
Resistance to Soldering Heat 耐焊接热	**AEC-Q200 TEST 15** **MIL-STD-202 Method 210**	Condition B No pre-heat of samples. Note: Single Wave Solder - Procedure 2 for SMD and Procedure 1 for Leaded with solder within 1.5mm of device body. 条件 B，样品不进行预热。注意 : 单一波峰焊 - 表面贴装元件按程序 2: 引脚产品按程序 1 进行焊接，浸入器件本体的 1.5mm 的深度	±(1.0%+0.05Ω)
Solderability 可焊性	**AEC-Q200 TEST 18** **J-STD-002**	For both Leaded & SMD. Electrical test not required.Magnification 50 X. Conditions:Leaded: Method A @ 235℃, category 3.SMD: a) Method B, 4 hrs @ 155℃ dry heat @ 235℃ b) Method B @ 215℃ category 3. c) Method D category 3 @ 260℃. 用于引脚和表面贴装元件，不需要电气测试 . 放大倍数 50 倍。 测试条件 : 引脚产品 : 方法 A@235℃ , 类别 3 表面贴装元件 : a) 方法 B,4 小时 @155℃干热 @235℃ . b) 方法 B@215℃类别 3. c) 方法 D 类别 3@260℃ .	Coverage must be over 95%.
Board Flex 弯曲	**AEC-Q200 TEST 21** **AEC-Q200-005**	60 sec minimum holding time. 至少 2mm，60 秒的支撑时间	±(1.0%+0.05Ω)
Sulfuration test 硫化测试		Soaked in industrial oil with sulfur substance 3.5% contained 105℃ ±3℃ 500h 工业用油含硫磺成份 3.5%，105℃±3, 500H	ΔR≤±(5%+0.05Ω)

Ordering Procedure (Example: 2S02 1/16W ±5%1.2K T/R-10000)

订购方式 (例如: 2S02 1/16W ±5%1.2K T/R-10000)

2 S 0 2 W G J 0 1 2 2 T C E

Product Type (产品类型):
Fill-in 4 digits with the Chip resistor type as follow (填四位数表示产品类型) :
2S02, 4S02, 4S03

Wattage (功率):
Fill-in 2 digits with the codes as follow (用下列代码填二位数):
WG=1/16W

Tolerance (公差):
F = ±1%
J = ±5%

Resistance Value (阻值):
5% (E-24 series) :
the 1st digit is "0", the 2nd & 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following
5% 产品 (E-24 系列阻值):
第 1 位数是 0，第 2、3 位数表示阻值的有效数，第 4 位表示有几个 0);
1%(E-96 series):
the 1st to 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following
1% 产品 (E-96 系列阻值):
第 1-3 位数表示阻值的有效数，第 4 位数表示有几个 0).

Packing Qty. (包装数量)
4=4,000pcs
5=5,000pcs
C=10,000pcs
D=20,000pcs
E=15,000pcs

Special Feature (特征):
E = Lead Free (standard)
(无铅标准品)

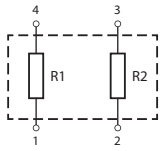
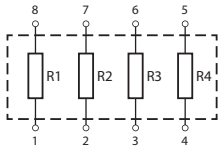
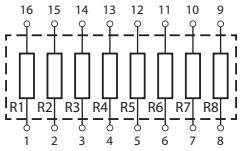
Packing Type (包装类型):
T=T/R (编带 / 卷带)
B=Bulk in Poly bag (散装 / 袋装)
C=Bulk in cassette (散装 / 盒装)

Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明 。

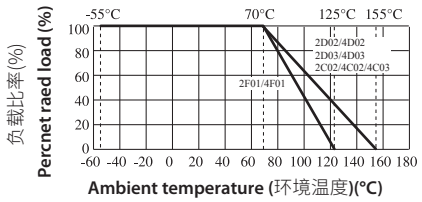
Feature (特性)

- High density, more than 1 resistors in one small case 高度密集, 多个电阻在一个表贴封装中
- Improvement of placement efficiency 装配效率高
- Tape/Reel packaging is suitable for automatic placement machine 编带卷装适合自动化机器
- Superior solderability 优越焊锡性
- Application: Master board, CD & DVD Rom, Hard Disk, RAM
  应用于 CD、DVD、硬盘、内存、主板等

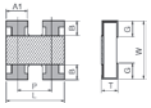
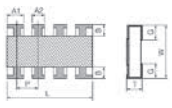
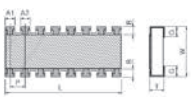
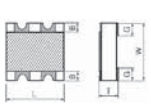
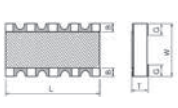
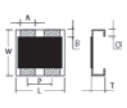
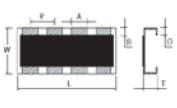
Equivalent Circuit Diagram (等效电路图)

2D02/2D03/2C02/2F01	4D02/4D03/4DP3/4C02/4C03/4F01	16P8
		
R1=R2	R1=R2=R3=R4	R1=R2=R3=R4=R5=R6=R7=R8

Derating Curve (降功率曲线)



Dimensions in mm (外观尺寸)

Convex Terminal type 凸式电极			Concave Terminal 凹式电极		Flat Terminal 平式电极	
2D02/2D03	4D02/4D03/4DP3	16P8	2C02	4C02/4C03	2F01	4F01
						

*The 16P8 series of Anti-sulfuration products are available in particular.
*16P8 系列抗硫化产品可特别提供

Type 类型	Dimensions 尺寸 (mm)							
	L	W	T	A1	A2	B	P	G
2D02 0402*2	1.00±0.10	1.00±0.10	0.35±0.10	0.33±0.10	/	0.15±0.05	0.65±0.05	0.25±0.10
4D02 0402*4	2.00±0.10	1.00±0.10	0.45±0.10	0.40±0.05	0.30±0.05	0.20±0.15	0.50±0.05	0.30±0.15
2D03 0603*2	1.60±0.15	1.60±0.15	0.50±0.10	0.60±0.15	/	0.30±0.10	0.80±0.05	0.25±0.10
4D03/4DP3 0603*4	3.20±0.20	1.60±0.20	0.50±0.10	0.65±0.15	0.50±0.15	0.30±0.15	0.80±0.10	0.30±0.15
16P8	4.00±0.20	1.60±0.15	0.45±0.10	0.45±0.05	0.30±0.05	0.30±0.15	0.50±0.05	0.40±0.15
2C02 0402*2	1.00±0.10	1.00±0.10	0.35±0.10	/	/	0.15±0. 10	/	0.30±0.10
4C02 0402*4	2.00±0.10	1.00±0.10	0.45±0.10	/	/	0.15±0.10	/	0.30±0.10
4C03 0603*4	3.20±0.20	1.60±0.20	0.60±0.10	/	/	0.30±0.20	/	0.40±0.10
2F01 0201*2	0.80±0.10	0.60±0.10	0.35±0.10	0.30±0.10	/	0.15±0.10	0.50±0.05	0.15±0.10
4F01 0201*4	1.40±0.10	0.60±0.10	0.35±0.10	0.20±0.10	/	0.15±0.10	0.40±0.05	0.15±0.10

Ratings (规格)

Type 类型	Rated power (功率) 70°C	Max Working Voltage 最大工作电压	Max Overload Voltage 最大过负荷电压	Dielectric Withstanding Voltage 绝缘耐压	Resistance Range 阻值范围 ±5%, ±1%	Temperature Coefficient 温度系数 PPM/°C	Operating Temperature 工作温度范围	Resistance Value of Jumper 零欧姆电阻阻值	Rated Current of Jumper 零欧姆电阻额定电流
2D02	1/16W	50V	100V	100V	10Ω~1MΩ	±200	-55°C~+155°C	<50mΩ	1A
4D02	1/16W	50V	100V	100V	10Ω~1MΩ	±200			
2D03	1/16W	50V	100V	100V	10Ω~1MΩ	±200			
4D03	1/16W	50V	100V	300V	1Ω~1MΩ	≥10Ω:±200 <10Ω:±400			
4DP3	1/10W	50V	100V	300V	1Ω~1MΩ	≥10Ω:±200 <10Ω:±400			
16P8	1/16W	50V	100V	300V	1Ω~1MΩ	≥10Ω:±200 <10Ω:±400			
2C02	1/16W	50V	100V	100V	10Ω~1MΩ	±200			
4C02	1/16W	50V	100V	100V	10Ω~1MΩ	±200			
4C03	1/10W	50V	100V	300V	1Ω~1MΩ	≥10Ω:±200 <10Ω:±400			
2F01	1/20W	12.5V	25V	/	10Ω~1MΩ	±200	-55°C~+125°C	<50mΩ	1A
4F01	1/20W	12.5V	25V	/	10Ω~1MΩ	±200			

Performance Specification (性能)

Short-time overload	短时间过负荷	± (2.0%±0.1Ω) 2F01: 1%: ±1%+0.05Ω, 5%: ±2%+0.05Ω
Insulation Resistance	绝缘电阻	≥1000MΩ
Dielectric withstanding voltage	绝缘耐压	No evidence of flashover mechanical damage, arcing or insulation break down. 无击穿，飞弧及可见机械性损伤
Terminal bending	端子弯曲	± (1.0%+±0.05Ω)
Soldering heat	耐焊接热	ΔR/R ≤ ± (1.0%+0.05Ω)
Solderability	可焊性	Coverage must be over 95%.
Rapid change of temperature	温度快速变化	ΔR/R ≤ ± (1.0%+0.05Ω) 2F01: 1%: ±0.5%+0.05Ω, 5%:±1%+0.05Ω
Load life in humidity	湿度寿命	± (3.0%±0.1Ω) 2F01: 1%:±2%+0.1Ω, 5%: 3.0%±0.1Ω
Load life	负载寿命	± (3.0%±0.1Ω) 2F01: 1%: ±2%+0.1Ω, 5%: 3.0%±0.1Ω

Ordering Procedure (Example: 2F01 1/20W ±5% 10K T/R-10000)

订购方式 (例如: 2F01 1/20W ±5% 10K T/R-10000)

2 F 0 1 W M J 0 1 0 3 T C E

Product Type (产品类型):
Fill-in 4 digits with the Chip resistor type as follow (填四位数表示产品类型) :
2F01, 4F01, 2D02, 2D03, 4D03, 4D02, 4DP3, 2C02, 4C02, 4C03, 16P8

Wattage (功率):
Fill-in 2 digits with the codes as follow (用下列代码填二位数):
WM=1/20W
WG=1/16W
WA=1/10W

Tolerance (公差):
F = ±1%
J = ±5%

Resistance Value (阻值):
5% (E-24 series) :
the 1st digit is "0", the 2nd & 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following
5% 产品 (E-24 系列阻值):
第 1 位数是 0，第 2、3 位数表示阻值的有效数，第 4 位表示有几个 0);
1%(E-96 series):
the 1st to 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following
1% 产品 (E-24, E-96 系列阻值):
第 1-3 位数表示阻值的有效数，第 4 位数表示有几个 0).

Packing Qty. (包装数量)
4=4,000pcs
5=5,000pcs
C=10,000pcs
D=20,000pcs
E=15,000pcs

Special Feature (特征):
E = Lead Free (standard)
(无铅标准品)

Packing Type (包装类型):
T=T/R (编带 / 卷带)
B=Bulk in Poly bag (散装 / 袋装)
C=Bulk in cassette (散装 / 盒装)

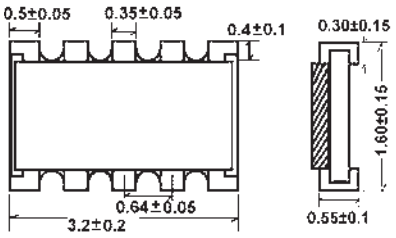
Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明。

Feature (特性)

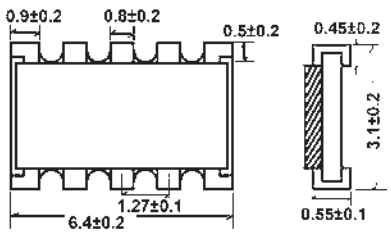
- High density, more than 1 resistors in one small case 高度密集, 多个电阻在一个表贴封装中
- Improvement of placement efficiency 装配效率高
- Tape/Reel packaging is suitable for automatic placement machine 编带卷装适合自动化机器
- Superior solderability 优越焊锡性

Dimension (尺寸) (mm)

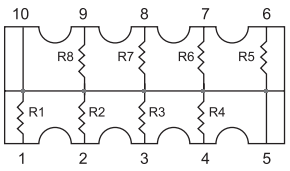
10P8, 10S8, 10T8, 10E9



8R06, 8S06

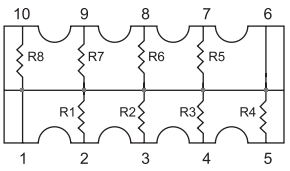


Equivalent Circuit Diagram (等效电路图)



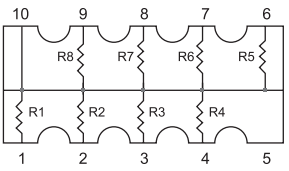
R1=R2=R3=R4=R5=R6=R7=R8

8R06 / 10P8 (P Type)



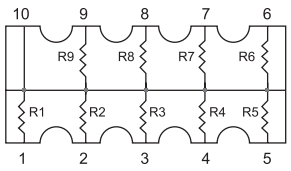
R1=R2=R3=R4=R5=R6=R7=R8

8S06/10S8 (S Type)



R1=R2=R3=R4=R5=R6=R7=R8

10T8 (T Type)



R1=R2=R3=R4=R5=R6=R7=R8=R9

10E9 (E Type)

Characteristics (特性)

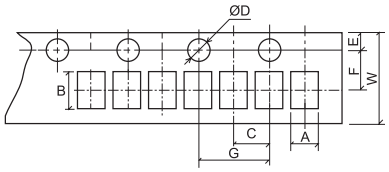
Rated Power at 70°C	功率	10P8,10S8,10T8,10E9 1/32W [1/16W sprcial provide (可特别提 供)]	8R06, 8S06 1/16W
Max. Working Voltage	最大工作电压	25V	50V
Max. Overload Voltage	最大过负荷电压	50V	100V
Dielectric withstanding Voltage	绝缘耐压	50V	100V
Operating temperature	工作温度	-55℃ ~ +155 ℃	55℃ ~ +155 ℃
Resistance Range	阻值范围	10Ω~1MΩ	±1% :30Ω~1MΩ ±5% :10Ω~1MΩ
Resistance Value of Jumper	零欧姆电阻阻值	<50mΩ	/
Rated Current of Jumper	零欧姆电阻额定电流	0.5A	/

Performance Specification (性能)

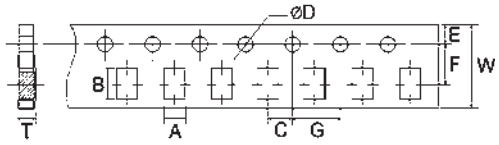
Temperature Coefficient	温度系数	±200PPM/℃
Short-time overload	短时间过负荷	±(2.0% ±0.05Ω)
Insulation resistance	绝缘电阻	≥1,000MΩ
Dielectric withstanding voltage	绝缘耐压	No evidence of flashover, mechanical damage, arcing or insulation breakdown 无击穿 , 飞弧及可见机械性损伤
Terminal bending	端子弯曲	±(1.0% ±0.05Ω)
Soldering heat	耐焊接热	ΔR/R ≤ ±(1.0% ±0.05Ω)
Solderability	可焊性	Coverage must be over 95%.
Load life in humidity	湿度寿命	±(3.0% ±0.1Ω)
Load life	负载寿命	±(3.0% ±0.1Ω)

• Please refer to page 12 for the information of Ordering Procedure (Part No.)
订购方式，请参考第 12 页（料号）

Dimension of Paper Taping (纸带尺寸)(mm)



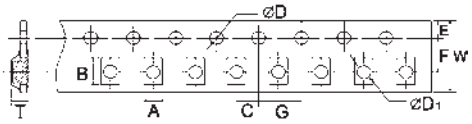
01005 0201 CQ01 2F01 4F01 PF0A NS01 0402 AS02 CQ02 HP02 HQ02 NM02
TC02 PF02 PS02 CS02 NS02 2C02 4C02 4D02 2D02 2S02 4S02



0603 CQ03 0805 CQ05 1206 CQ06 1210 CQ10 2010 CQ07 0508 0612 1020 HQ03 HQ05 HQ06 HQ07 HQ10 HP03 HP05 HP06 HP07 HP10
HV03 HV05 HV06 HV07 HV10 NM03 NM05 NM06 NS03 NS05 NS06 NS07 NS10 AS03 AS05 AS06 AS07 AS10 PS03 PS05 PS06 PS07 PS10
CS03 CS05 CS06 CS07 CS10 TC03 TC05 TC06 TC07 TC10 TR05 TR06 2F01 4F01 2D03 4D03 4C03 10P8 10S8 10T8 10E9 16P8

Type (类型)	A±0.2	B±0.2	C±0.05	$ØD^{+0.1}_{-0}$	E±0.1	F±0.05	G±0.1	W±0.2	T±0.1
01005, PF0A	0.24±0.05	0.45±0.05	2.0	1.5	1.75	3.5	4.0	8.0	0.40
0201, CQ01, ES01, PF01, NS01, NQ01	0.40±0.05	0.70±0.05	2.0	1.5	1.75	3.5	4.0	8.0	0.42
0402, CQ02, AS02, CS02, NQ02, ES02, HP02, HQ02, PF02, LT02, NM02, TC02, PS02	0.65±0.1	1.2±0.1	2.0	1.5	1.75	3.5	4.0	8.0	0.42±0.05
0603, CQ03, AS03, PS03, NQ03, ES03, HP03, HQ03, HV03, PF03, LT03, NM03, NS03, TC03, TR03	1.10	1.90	2.0	1.5	1.75	3.5	4.0	8.0	0.67
0805, CQ05, AS05, NQ05, CS05, ES05, HP05, HV05, HQ05, PF05, LT05, LE05, MS05, NM05, NS05, PS05, TC05, TR05, WR08	1.65	2.40	2.0	1.5	1.75	3.5	4.0	8.0	0.81
1206, CQ06, AS06, NQ06, CS06, ES06, HP06, HQ06, HV06, PF06, LR06, LT06, LE06, MS06, NS06, NM06, PS06, TC06, TR06, WR12	2.00	3.60	2.0	1.5	1.75	3.5	4.0	8.0	0.81
1210, CQ07, AS07, NQ07, HQ07, HP07, CS07, ES07, HV07, PF07, PS07, AS07, TC07, NS07	2.80	3.50	2.0	1.5	1.75	3.5	4.0	8.0	0.75
2D02, 2C02, 2S02	1.20	1.20	2.0	1.5	1.75	3.5	4.0	8.0	0.45
4D02, 4C02, 4S02	1.20	2.20	2.0	1.5	1.75	3.5	4.0	8.0	0.70
2F01	0.79	1.0	2.0	1.5	1.75	3.5	4.0	8.0	0.5
4F01	0.9	1.7	2.0	1.5	1.75	3.5	4.0	8.0	0.5
2D03	1.90	1.90	2.0	1.5	1.75	3.5	4.0	8.0	0.83
4D03, 4C03, 4S03	2.00	3.60	2.0	1.5	1.75	3.5	4.0	8.0	0.83
10P8, 10S8, 10T8, 10E9	2.00	3.60	2.0	1.5	1.75	3.5	4.0	8.0	0.85
16P8	1.80	4.30	2.0	1.5	1.75	5.5	4.0	12.0	0.75

Dimension of Embossed Taping (塑胶带尺寸)(mm)

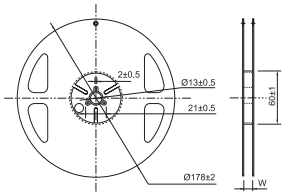


Type (类型)	A±0.2	B±0.2	C±0.05	$ØD^{+0.1}_{-0}$	$ØD_{1}^{+0.25}_{-0}$	E±0.1	F±0.05	G±0.1	W±0.2	T±0.1
2010, AS10, CQ10, NQ10, HQ10, HP10, CS10, HV10, NS10, MS10, LR10, PS10, PF10, TC10, WR20,	2.9	5.6	2.0	1.5	1.5	1.75	5.5	4.0	12	1.0
1812, CS11, HP11, WR18	3.5	4.8	2.0	1.5	1.5	1.75	5.5	4.0	12	1.0
2512, CQ12, AS12, CS12, NQ12, HP12, HQ12, HV12, PF11, PF12, MS12, LR12, NM12, PS12, TC12, RS12, WR25	3.5	6.7	2.0	1.5	1.5	1.75	5.5	4.0	12	1.0
8R06, 8S06	3.4	6.6	2.0	1.5	1.5	1.75	5.5	4.0	12	1.0
SP10	2.90	5.6	2.0	1.5	1.5	1.75	5.5	4.0	12	1.35
SP12	3.50	6.7	2.0	1.5	1.5	1.75	5.5	4.0	12	1.35
SP17	4.50	7.4	2.0	1.5	-	1.75	7.5	4.0	16	1.35
SP20	5.40	11.5	2.0	1.5	-	1.75	11.5	4.0	24	1.35
SP27	7.20	11.9	2.0	1.5	-	1.75	11.5	4.0	24	1.35

Packing of Surface Mount Resistors
表面贴装式电阻器包装

Dimension of Reel (卷轴尺寸)(mm)

Type (类型)	Tape 编带	Qty. / Reel 数量 / 卷装	Tape Width 纸带宽	W±1
01005, PF0A	Paper 纸带	20,000pcs	8mm	10
0201, CQ01, 2F01, 4F01, ES01, NQ01, NS01, PF01	Paper 纸带	15,000pcs	8mm	10
0402, CQ02, CS02, ES01, ES02, HP02, HQ02, LF01, LT02, NM02, NQ02, NS02, PF02, PS02, TC02	Paper 纸带	10,000pcs	8mm	10
0603, CQ03, AS03, CS03, ES03, HP03, HQ03, HV03, LT03, NM03, NS03, NQ03, PF03, PS03, TC03	Paper 纸带	5,000pcs	8mm	10
0805, CQ05, AS05, CS05, ES05, HP05, HQ05, HV05, LT05, MS05, NM05, NQ05, NS05, PF05, PS05, TC05, TR05, WR08	Paper 纸带	5,000pcs	8mm	10
1206, CQ06, AS06, CS06, ES06, HP06, HQ06, HV06, LT06, MS06, LR06, NM06, NQ06, PF06, PS06, TC06, TR06, WR12,	Paper 纸带	5,000pcs	8mm	10
1210, CQ07, AS07, CS07, NQ07, ES07, HP07, HQ07, HV07, PF07, PS07, AS07, TC07	Paper 纸带	5,000pcs	8mm	10
2010, CQ10, AS10, CS10, HP10, HQ10, HV10, PF10, MS10, LR10, NQ10, PS10, WR20	Paper 纸带	4,000pcs	12mm	13.8
WR18, 1812, CS11, HP11, TC10, PF11	Embossed 塑胶带	4,000pcs	12mm	13.8
2512, CQ12, AS12, CS12, HP12, HQ12, HV12, MS12, NM12, NQ12, PF12, PS12, TC12, WR25	Embossed 塑胶带	4,000pcs	12mm	13.8
2D02, 2C02, 2S02	Paper 纸带	10,000pcs	8mm	10
4D02, 4C02, 4S02	Paper 纸带	10,000pcs	8mm	10
2D03, 4D03, 4C03, 4S03	Paper 纸带	5,000pcs	8mm	10
10P8, 10S8, 10T8, 10E9	Paper 纸带	5,000pcs	8mm	10
16P8	Paper 纸带	4,000pcs	12mm	13.8
8R06, 8S06	Embossed 塑胶带	4,000pcs	12mm	13.8
LR12, RS12	Embossed 塑胶带 / Paper 纸带	2,000pcs	12mm	13.8
SP10, SP12	Embossed 塑胶带	2,000pcs	12mm	13.5
SP17	Embossed 塑胶带	2,000pcs	16mm	17.5
SP20, SP27	Embossed 塑胶带	1,000pcs	24mm	25.5



*Remark: 15,000 pcs/reel package could be offered for 0402 size. (备注：0402 可提供 15,000 只包装)

Dimension of Bulk Cassette (散装盒尺寸) (mm)

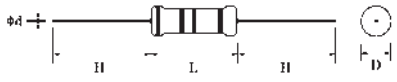
36(H)×12(W)×110(L)

Bulk Cassette packing available on a case to case basis (散装可特别提供)

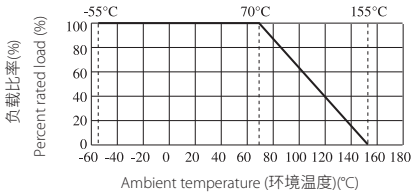
Feature (特性)

- High quailty performance 高品质
- Great economy 低成本
- Flame Retardant available 可提供不燃性涂装
- Automatically insertable 适用自动化插件

Dimension(尺寸) mm



Derating Curve (降功率曲线)



Specification(性能)

料号	类型	Power Rating 功率 70 °C	Dimension (尺寸)(mm)					MAX. Working Voltage 最大工作电压	MAX. Overlaod Voltage 最大过负荷电压	Dielectric Withstanding Voltage 绝缘耐压	Resistance Range 阻值范围	Tolerance 公差
			D	L	d ±0.05	H±3	PT					
Ordinary Products(普通产品)												
CFR0W8	CFR-12	1/8W	1.9±0.3	3.3±0.3	0.45	28	52	200V	400V	400V	1Ω~1MΩ	±2% ±5% ±10%
CFR0S4	CFR-25-S	1/4W-S	1.9±0.3	3.3±0.3	0.45	28	52	200V	400V	400V	1Ω~1MΩ	
CFR0W4	CFR-25	1/4W	2.2±0.3	6.5±1.0	0.54	28	52	250V	500V	500V	1Ω~10MΩ	
CFR0W2	CFR-50	1/2W	3.0±0.6	9.5±1.0	0.54	28	52	350V	700V	700V	1Ω~10MΩ	
CFR01S	CFR-100-S	1W-S	4.5±0.6	11.5±1.0	0.70	25	52	500V	1000V	1000V	1Ω~10MΩ	
CFR01W	CFR-100	1W	5.0±0.6	15.5±1.0	0.70	28	64	500V	1000V	1000V	1Ω~10MΩ	
CFR02S	CFR-200-S	2W-S	5.0±0.6	15.5±1.0	0.70	28	64	500V	1000V	1000V	1Ω~10MΩ	
CFR02W	CFR-200	2W	6.0±0.6	17.5±1.0	0.75	28	64	500V	1000V	1000V	1Ω~10MΩ	
CFR03S	CFR-300-S	3W-S	6.0±0.6	17.5±1.0	0.75	28	64	500V	1000V	1000V	1Ω~10MΩ	
High Power Products(高功率产品)												
CPR0W2	CPR-50	1/2W	2.2±0.5	6.5±1.0	0.54	28	52	300V	500V	700V	3Ω~10MΩ	±2% ±5% ±10%
CPR01W	CPR-100	1W	3.5±0.5	9.5±1.0	0.54	28	52	500V	700V	1000V	3Ω~10MΩ	
CPR02W	CPR-200	2W	4.5±0.5	11.0±1.0	0.70	25	52	500V	1000V	1000V	3Ω~10MΩ	

- Standard E-24 series values in ±5% ±10% & ±20% tolerance
  标准 E-24 系列公差为 ±5%、±10% & ±20%
- Standard: Beige color, CFR1WS, CFR2WS, CFR3WS with light brown color, High Power Products with Grey-green
  正常尺寸涂标准米黄色底漆，CFR1WS、CFR2WS、CFR3WS 涂浅棕色底漆，高功率产品涂灰绿色底漆
- For any special inquiry such as too Low or too High ohmic values is availabie on a case to case basis
  特殊要求，含超高、超低阻值也可特别安排生产

Performance Specification(性能)

Temperature coefficient	温度系数	≤10 Ω: ±300PPM/℃; 11Ω~99KΩ: ±450PPM/℃ 100KΩ~1MΩ: 0~-700PPM/℃; 1.1MΩ~10MΩ: 0~-1500PPM/℃;
Short-time Overload	短时间过负荷	CFR Products（CFR 产品）：ΔR/R ≤ ±(1%+0.05 Ω) CPR Products（CPR 产品）：ΔR/R ≤ ±(0.75%+0.05 Ω)
Dielectric withstanding voltage	绝缘耐压	With no evidence of flashover,mechanical damage,arcing or insulation breakdown （无击穿 · 飞弧及可可见机械损伤）
Terminal strength	端子强度	No evidence of mechanical damage （无可见机械损伤）
Soldering heat	耐焊接热	ΔR/R ≤ ±(1%+0.05 Ω) with no evidence of mechanical damage（无可见机械损伤）
Solderability	可焊性	Coverage must be over 95%.
Resistance to solvent	耐熔剂	No deterioration of protective coating and markings (包封层，色码完整)
Rapid change of temperature	温度快速变化	ΔR/R ≤ ±(1%+0.05 Ω) with no evidence of mechanical damage（无可见机械损伤）
Load life in humidity	湿度寿命	CFR Ordinary Products (CFR 普通产品)：ΔR/R ±3%for ＜ 100kΩ ,±5% for ≥100kΩ CFR Flame retardant type(CFR 不燃性): ΔR/R ±5%for ＜ 100kΩ ,±10%for ≥100kΩ High Power Products (高功率产品):ΔR/R ±(3%+0.05Ω)
Load life	负载寿命	CFR Ordinary Products (普通产品)：ΔR/R ±2%for ＜ 56kΩ ,±3%for ≥56kΩ CFR Flame retardant type (CFR 不燃性产品): ΔR/R ±5%for ＜ 100kΩ ,±10%for ≥100kΩ High Power Products (高功率产品):ΔR/R ±(3%+0.05Ω)

Ordering Procedure (Example: CFR 1/4WS 5% 10Ω T/B-5000)

订购方式 (例如: CFR1/4WS 5% 10Ω T/B-5000)

C F R 0 S 4 J 0 1 0 0 A 5 0

Product Type (产品类型):
CFR=Carbon Film Fixed Resistors (碳膜固定电阻器)
CPR=Carbon Film Power Resistors (高功率碳膜电阻器)

Wattage (功率):
W8=1/8W
W4/=1/4W
W2=1/2W
1W=1W
2W=2W
S4=1/4WS
1S=1W-S
2S=2WS
3S=3W-S

Special Feature (特征):
0 = Standard (标准产品)
F = Flame Retardant (阻燃型)
I = Non-Inductive (无感型)

Tolerance (公差):
G = ± 2%
J = ± 5%
K = ± 10%

Resistance Value (阻值):
2%, 5%, 10% (E-24 series):
the 1st digit is "0", the 2nd & 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following;
2%, 5%, 10% 产品 (E-24 系列阻值):
第 1 位是 0, 第 2、3 位表示阻值的有效数 , 第 4 位表示有几个 0.

≤1% (E-96 series):
the 1st to 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following.
≤1% 产品 (E-96 系列阻值):
第 1~3 位表示阻值的有效数 , 第 4 位表示有几个 0.

Packing Type(包装类型):
A=Tape/Box (编带 / 盒装)
T=Tape/Reel (编带 / 卷装)
B=Bulk/Box (散装 / 盒装)
P=Tape/Box of PT-26 product 编带 (PT-26 产品) / 盒装

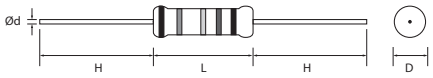
Packing Qty. (包装数量):
1=1,000pcs
2=2,000pcs
3=3,000pcs
4=4,000pcs
5=5,000pcs
A=500pcs
B=2,500pcs
0=Bulk/Box (散装 / 盒装)

Additional Information(注):
0=NIL(标准品)
P=Panasert type
1=Avisert type 1
2=Avisert type 2
3=Avisert type 3
8=PT-58mm
9=PT-64mm
7=Lead wire(H)38mm
A=PT-83mm
C=PT-73mm
D=PT-71mm

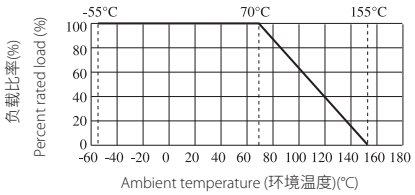
Feature (特性)

- EIA standard color. EIA标准色码
- Flame Retardant type available 可提供不燃性漆
- Low noise & voltage coefficient 噪声低，电压系数小
- Low temperature coefficient range 温度系数低
- Multiple epoxy coating on vacuum-deposited metal film provideds superior moisture protection
  真空溅射金属皮膜涂多层环氧树脂，防水性效果好
- Nichrome resistive element provides stable performance in various environments
  镍基金属膜层的采用使各项性能更加稳定

Dimension(尺寸) mm



Derating Curve (降功率曲线)



Specification(性能)

Part No 料号	Type 类型	Power Rating 功率 70 °C	Dimension (尺寸)(mm)					MAX. Working Voltage 最大工作电压	MAX. Overlaod Voltage 最大过负荷电压	Dielectric Withstanding Voltage 绝缘耐压
			D	L	d ±0.05	H±3	PT			
MF0W8	MF-12	1/8W	1.9±0.3	3.3±0.3	0.45	28	52	200V	400V	400V
MF0S4	MF-25-S	1/4W-S	1.9±0.3	3.3±0.3	0.45	28	52			
MF004	MF-40-SS	0.4W-SS	1.9±0.5	3.3±0.3	0.45	28	52	200V	400V	400V
MF0W4	MF-25	1/4W	2.2±0.3	6.5±1.0	0.54	28	52	250V	500V	500V
MF0S2	MF-50-S	1/2W-S	2.2±0.5	6.5±1.0	0.54	28	52	250V	500V	250V
MF0W2	MF-50	1/2W	3.0±0.6	9.5±1.0	0.54	28	52	350V	700V	700V
MF006	MF-60-S	0.6W-S	2.2±0.5	6.5±1.0	0.54	28	52	250V	500V	500V
MF01S	MF-100-S	1W-S	3.0±0.6	9.5±1.0	0.54	28	52	350V	700V	700V
MF01W	MF-100	1W	4.5±0.6	11.5±1.0	0.70	25	52	500V	1000V	1000V
MF02S	MF-200-S	2W-S	4.5±0.6	11.5±1.0	0.70	25	52	500V	1000V	1000V
MF02W	MF-200	2W	5.0±0.6	15.5±1.0	0.70	28	64	500V	1000V	1000V
MF03S	MF-300-S	3W-S	5.0±0.6	15.5±1.0	0.70	28	64	500V	1000V	1000V
MF03W	MF-300	3W	6.0±0.6	17.5±1.0	0.75	28	64	500V	1000V	1000V

Part No 料号	Type 类型	Standard Order 标准品			Special Order 特殊订购品		
		Tolerance 公差	Resistance Range 阻值范围	TCR 温度系数	Tolerance 公差	Resistance Range 阻值范围	TCR 温度系数
MF0W8	MF0W8	±1%	10Ω~1MΩ	±50	±0.25%	51.1Ω~200KΩ	±15
MF0S4	MF0S4	±2%	10Ω~1MΩ	±100	±0.5%	51.1Ω~511KΩ	±25
MF004	MF004	±5%	1Ω~1MΩ	±200	±0.5%	51.1Ω~511KΩ	±50
MF0W4	MF-25	±1%	10Ω~1MΩ	±50	±0.1%	10Ω~1MΩ	±15
MF0S2	MF-50-S	±2%	1Ω~1MΩ	±100	±0.25%	10Ω~1MΩ	±25
MF006	MF-60-S	±5%	1Ω~1MΩ	±200	±0.5%	10Ω~1MΩ	±50
MF0W2	MF-50	±1%	10Ω~1MΩ	±50	±0.1%	100Ω~330KΩ	±15
MF01S	MF-100-S	±2%	10Ω~1MΩ	±100	±0.25%	51.1Ω~511KΩ	±25
		±5%	1Ω~1MΩ	±200	±0.5%	10Ω~1MΩ	±50
MF01W	MF-100	±1%	51.1Ω~1MΩ	±50	±0.1%	100Ω~330KΩ	±15
MF02S	MF-200-S	±2%	51.1Ω~1MΩ	±100	±0.25%	51.1Ω~511KΩ	±25
MF02W	MF-200						
MF03S	MF-300-S	±5%	1Ω~1MΩ	±200	±0.5%	51.1Ω~1MΩ	±50
MF03W	MF-300						

Performance Specification(性能)

Short-time Overload	短时间过负荷	ΔR/R ≤ ±(0.5%+0.05 Ω),with no evidence of mechanical damage (无可见机械损伤)
Dielectric withstanding voltage	绝缘耐压	With no evidence of flashover, mechanical damage,arcing or insulation breakdown (无击穿 · 飞弧及可可见机械损伤)
Pulse Overload	脉冲过负荷	ΔR/R ≤ ± （1%+0.05),with no evidence of mechanical damage (无可见机械损伤)
Terminal strength	端子强度	No evidence of mechanical damage （无可见机械损伤)
Soldering heat	耐焊接热	ΔR/R ≤ ±(1%+0.05 Ω) with no evidence of mechanical damage (无可见机械损伤)
Solderability	可焊性	Coverage must be over 95%.
Resistance to solvent	耐熔剂	No deterioration of protective coating and markings (包封层，色码完整)
Rapid change of temperature	温度快速变化	ΔR/R ≤ ±(1%+0.05 Ω） with no evidence of mechanical damage （无可见机械损伤)
Load life in humidity	湿度寿命	Normal type(普通型):ΔR/R ≤ ±1.5% & Flame retardant type(阻燃性): ΔR/R ≤ ±5%
Load life	负载寿命	Normal type(普通型):ΔR/R ≤ ±1.5% & Flame retardant type(阻燃性): ΔR/R ≤ ±5%

Ordering Procedure (Example: MF 1/8W 1% 47.5KΩ T/R-5000)

订购方式 (例如: MF 1/8W 1% 47.5KΩ T/R-5000)

M F 0 W 8 F F 4 7 5 2 T 5 0

Product Type (产品类型):
MF=Precision Metal Film Fixed Resistors
(精密金属膜固定电阻器)

Special Feature (特征):
0=Standard(标准品)
F=Flame retardant (阻燃型)
I=Non-Inductive (无感型)
C=Flammable type （可燃性）

Wattage (功率):
W8=1/8W S4=1/4WS
W4=1/4W 04=0.4W-SS
S2=1/2WS W2=1/2W
06=0.6W-S 1S=1W-S
1W=1W 2S=2W-S
2W=2W 3S=3W-S
3W=3W

Tolerance (公差):
B=±0.1%
C=±0.25%
D=±0.5%
F=±1%
G=±2%
J=±5%

PPM requirement:
B=15PPM
C=25PPM
F=50PPM
G=100PPM
J=200PPM

Resistance Value (阻值):
2%, 5%, 10% (E-24 series):
the 1st digit is "0", the 2nd & 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following;
2%, 5%, 10% 产品 (E-24 系列阻值):
第 1 位是 0, 第 2、3 位表示阻值的有效数 , 第 4 位表示有几个 0.

≤1% (E-96 series):
the 1st to 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following.
≤1% 产品 (E-96 系列阻值):
第 1~3 位表示阻值的有效数 , 第 4 位表示有几个 0.

Packing Type(包装类型):
A=Tape/Box (编带 / 盒装)
T=Tape/Reel (编带 / 卷装)
B=Bulk/Box （散装 / 盒装)
P=Tape/Box of PT-26 product
编带 （PT-26 产品） / 盒装

Packing Qty. (包装数量):
1=1,000pcs
2=2,000pcs
3=3,000pcs
4=4,000pcs
5=5,000pcs
A=500pcs
B=2,500pcs
0=Bulk/Box
（散装 / 盒装)

Additional Information(注):
0=NIL(标准品)
P=Panasert type
1=Avisert type 1
2=Avisert type 2
3=Avisert type 3
8=PT-58mm
9=PT-64mm
7=Lead wire(H)38mm
A=PT-83mm
C=PT-73mm
D=PT-71mm

New/Old Part.no Contrast (新旧料号对照)

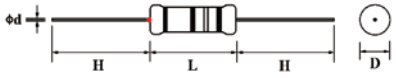
New Part.no 新料号	Old Part.no 旧料号
MF0W8FF**A*0**	MFR0W8F****A*0
MF0S4FF**A*0**	MFR0S4F****A*0
MF004FF**A*0**	MFR004F****A*0
MF0W4FF**A*0**	MFR0W4F****A*0
MF0S2FF**A*0**	MFR0S2F****A*0
MF0W2FF**A*0**	MFR0W2F****A*0
MF006FF**A*0**	MFR006F****A*0

New Part.no 新料号	Old Part.no 旧料号
MF01SFF**A*0**	MFR01SF****A*0
MF01WFF**A*0**	MFR01WF****A*0
MF02SFF**A*0**	MFR02SF****A*0
MF02WFF**A*0**	MFR02WF****A*0
MF03SFF**A*0**	MFR03SF****A*0
MF03WFF**A*0**	MFR03WF****A*0

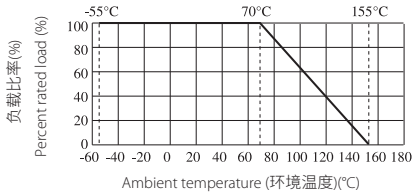
Feature (特性)

- High power in small body size 体积小功率高
- Excellent flame Retardant coating 优异不燃性涂装
- High stablity even in bad environment 恶劣环境下同样稳定工作
- Match the safety requirement 满足安全标准要求

Dimension(尺寸) mm



Derating Curve (降功率曲线)



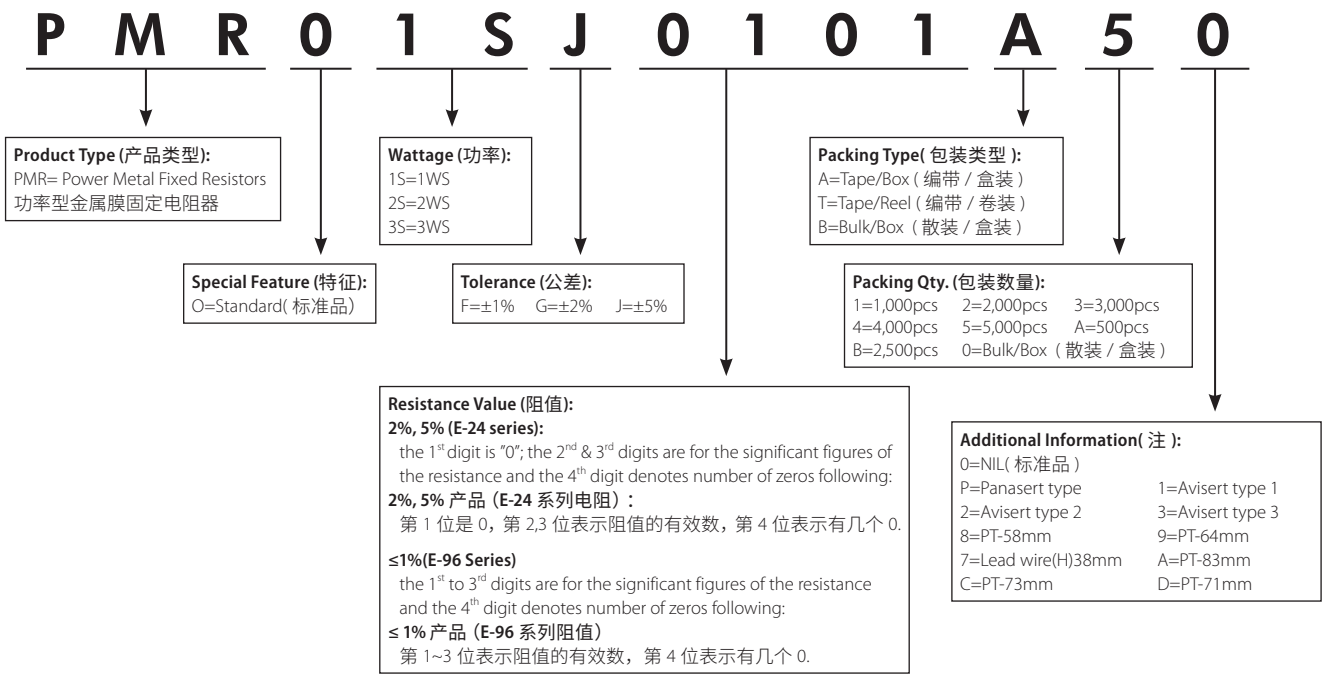
Part No 料号	Type 类型	Power Rating 功率 70°C	Dimension (尺寸)(mm)					MAX.Working Voltage 最大工作电压	MAX.Overlaod Voltage 最大过负荷电压	Dielectric Withstanding Voltage 绝缘耐压	Resistance Range 阻值范围
			D	L	d ±0.05	H±3	PT				
PMR01S	PMR-100-S	1WS	2.2±0.5	6.5±1.0	0.54	28	52	500V	600V	350V	10Ω~10MΩ
PMR02S	PMR-200-S	2WS	4.0±0.6	11.0±1.0	0.70	25	52	500V	600V	350V	3.9Ω~680KΩ
PMR03S	PMR-300-S	3WS	5.0±0.6	15.5±1.0	0.75	28	64	750V	800V	350V	12Ω~180KΩ

Performance Specification(性能)

Temperature coefficient	温度系数	1WS: ±200PPM/°C (± 2%); ±250PPM/°C (±5%) 2WS: ±350PPM/°C (3.9Ω~100KΩ); ±400PPM/°C (101KΩ~680KΩ) 3WS: ±350PPM/°C (12Ω~100KΩ); ±400PPM/°C (101KΩ~180KΩ)
Short-time Overload	短时间过负荷	ΔR/R ≤ ±(2%+0.05 Ω), with no evidence of mechanical damage（无可见机械损伤）
Terminal strength	端子强度	with no evidence of mechanical damage（无可见机械损伤）
Soldering heat	耐焊接热	ΔR/R ≤ ±(1%+0.05 Ω), with no evidence of mechanical damage（无可见机械损伤）
Solderability	可焊性	Coverage must be over 95%.
Rapid change of temperature	温度快速变化	ΔR/R ≤ ±(2%+0.05 Ω) with no evidence of mechanical damage（无可见机械损伤）
Load life in humidity	湿度寿命	1WS: ΔR/R ≤ ±(5%+0.05 Ω) 2WS&3WS: <100KΩ: ΔR/R ≤ ±(5%+0.05 Ω) ≥100KΩ: ΔR/R ≤ ±(10%+0.05 Ω)
Load life	负载寿命	1WS: ΔR/R ≤ ±(5%+0.05 Ω) 2WS&3WS: <100KΩ: ΔR/R ≤ ±(5%+0.05 Ω) ≥100KΩ: ΔR/R ≤ ±(10%+0.05 Ω)
Flame retardant	阻燃	Resistor insulation is self-extinguishing within 10 seconds after externally applied flame is removed 火焰移开后 10 秒内，电阻自动绝燃，无可见火焰

Ordering Procedure (Example: PMR1WS 5% 100Ω T/B-5000)

订购方式 (例如: PMR1WS 5% 100Ω T/B-5000)



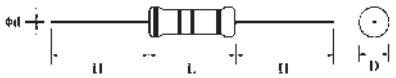
New/Old Part.no Contrast (新旧料号对照)

New Part.no 新料号	Old Part.no 旧料号
PMR01SJ**A*0**	MPR01WJ****A*0
PMR03SJ**A*0**	MPR03WJ****A*0

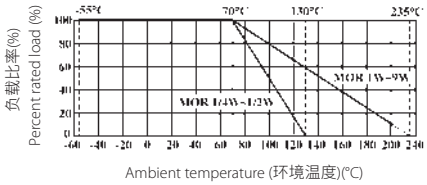
Feature (特性)

- Excellent flame retardant coating 优异不燃性涂装
- High stability even in bad environment
  恶劣环境下同样稳定工作
- High purity ceramic core 高纯度瓷芯
- Meet EIA-RC2655A requirements 满足EIA-RC2655A标准要求
- High safety standard 满足安全性标准要求

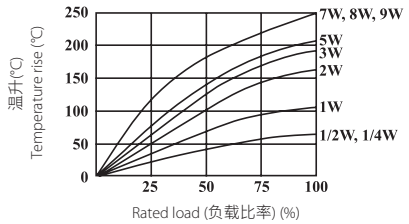
Dimension(尺寸) mm



Derating Curve (降功率曲线)



Heat Rise Chart (表面温升)



Specification(性能)

Part No. 料号	Type 类型	Power Rating 功率 70°C	Dimension (尺寸)(mm)					MAX. Working Voltage 最大工作电压	MAX. Overlaod Voltage 最大过负荷电压	Dielectric Withstanding Voltage 绝缘耐压	Resistance Range 阻值范围
			D	L	d ±0.05	H±3	PT				
MOR0W4	MOR-25	1/4W	2.2±0.5	6.5±1.0	0.54	28	52	250V	400V	250V	0.1Ω~470KΩ
MOR0S2	MOR-50-S	1/2W-S	2.2±0.5	6.5±1.0	0.54	28	52	250V	400V	250V	0.1Ω~470KΩ
MOR0W2	MOR-50	1/2W	3.0±0.6	9.5±1.0	0.54	28	52	250V	400V	250V	0.1Ω~560KΩ
MOR01S	MOR-100-S	1W-S	3.5±0.6	9.5±1.0	0.54	28	52	350V	600V	350V	0.1Ω~560KΩ
MOR01W	MOR-100	1W	4.5±0.6	11.5±1.0	0.70	25	52	350V	600V	350V	0.1Ω~560KΩ
MOR02S	MOR-200-S	2W-S	4.5±0.6	11.5±1.0	0.70	25	52	350V	600V	350V	0.1Ω~560KΩ
MOR02W	MOR-200	2W	5.0±0.6	15.5±1.0	0.70	28	64	350V	600V	350V	0.1Ω~560KΩ
MOR03S	MOR-300-S	3W-S	5.0±0.6	15.5±1.0	0.70	28	64	350V	600V	350V	0.1Ω~560KΩ
MOR03W	MOR-300	3W	6.0±0.6	17.5±1.0	0.75	28	64	500V	800V	500V	0.1Ω~560KΩ
MOR05S	MOR-500-S	5W-S	6.0±0.6	17.5±1.0	0.75	28	64	500V	800V	500V	0.1Ω~560KΩ
MOR05W	MOR-500	5W	8.0±0.6	24.5±1.0	0.75	38	90	750V	1000V	750V	0.1Ω~680KΩ
MOR07W	MOR-700	7W	8.0±0.6	29.5±1.0	0.75	38	B/B	750V	1000V	750V	20Ω~150KΩ
MOR08W	MOR-800	8W	8.0±0.6	39.5±1.0	0.75	38	B/B	750V	1000V	750V	30Ω~200KΩ
MOR09W	MOR-900	9W	8.0±0.6	52.5±1.0	0.75	38	B/B	750V	1000V	750V	50Ω~200KΩ

- Standard E-24 Series ±5% tolerance 标准 E-24 系列 ±5% 公差阻值
- Standard Gray base color for Normal Size product,Blue color for Small Size product 正常尺寸产品涂灰色底漆，小尺寸产品涂海蓝色底漆
- Standard Non-Flammable coating 标准不燃性涂装
- Non-Inductive type available on a case to case basis 无感，可特别生产

Performance Specification(性能)

Temperature coefficient	温度系数	1/4W,1/2WS: ≤ 100K Ω：±350PPM/℃； 100KΩ<R≤470KΩ：0~-700PPM/℃ 1/2W,1WS: ≤ 120K Ω：±350PPM/℃； 120KΩ<R≤560KΩ：0~-700PPM/℃ 1W,2W,2WS,3W,3WS,5WS: ≤ 150K Ω：±350PPM/℃； 150KΩ<R≤560KΩ：0~-700PPM/℃ 5W,: ≤ 180K Ω：±350PPM/℃； 180KΩ<R≤680KΩ：0~-700PPM/℃ 7W,8W，9W: ±350PPM/℃
Short-time Overload	短时间过负荷	Normal size(正常尺寸), ΔR/R ≤ ±(1%+0.05 Ω), with no evidence of mechanical damage（无可见机械损伤） Small size(小尺寸), ΔR/R ≤ ±(2%+0.05 Ω), with no evidence of mechanical damage（无可见机械损伤）
Dielectric withstanding voltage	绝缘耐压	No evidence of flashover, mechanical damage,arcing or insulation breakdown (无击穿、飞弧及可见机械损伤)
Pulse Overload	脉冲过负荷	Normal size(正常尺寸), ΔR/R ≤ ±(2%+0.05 Ω), with no evidence of mechanical damage（无可见机械损伤） Small size(小尺寸), ΔR/R ≤ ±(5%+0.05 Ω), with no evidence of mechanical damage（无可见机械损伤）
Terminal strength	端子强度	No evidence of mechanical damage （无可见机械损伤)
Soldering heat	耐焊接热	ΔR/R ≤ ± (1%+0.05 Ω)， with no evidence of mechanical damage（无可见机械损伤）
Solderability	可焊性	Coverage must be over 95%.
Resistance to solvent	耐熔剂	No deterioration of protective coating and markings (包封层，色码完整）
Rapid change of temperature	温度快速变化	ΔR/R ≤ ± (2%+0.05 Ω) with no evidence of mechanical damage（无可见机械损伤）
Humidity (Steady State)	恒定湿热	ΔR/R ≤ ± (2%+0.05 Ω) with no evidence of mechanical damage（无可见机械损伤）
Load life in humidity	湿度寿命	<100kΩ: ± (5%+0.05Ω) ≥100kΩ: ±(10%+0.05Ω)
Load life	负载寿命	<100kΩ: ± (5%+0.05Ω) ≥100kΩ: ±(10%+0.05Ω)
Flame retardant	阻燃	Resistor insulation is self-extinguishing within 10 seconds after externally applied flame is removed （火焰移开后 10 秒内，电阻自动绝燃，无可见火焰）

Ordering Procedure (Example: MOR 1W-S 5% 8.2Ω T/B-1000)

订购方式 (例如: MOR 1W-S 5% 8.2Ω T/B-1000)

M O R 0 1 S J 0 8 2 J A 1 0

Product Type (产品类型):
MOR=Metal Oxide Film Fixed Resistors
(金属氧化膜固定电阻器)

Special Feature (特征):
O=Standard(标准品)
I=Non-Inductive (无感型)

Wattage (功率):

W4=1/4W	S2=1/2WS	W2=1/2W
1S=1W-S	1W=1W	2S=2W-S
2W=2W	3S=3W-S	3W=3W
5S=5W-S	5W=5W	7W=7W
8W=8W	9W=9W	

Tolerance (公差):
G=2% J=±5% K=±10%

Resistance Value (阻值):
2%, 5%, 10% (E-24 series):
the 1st digit is "0", the 2nd & 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following;
2%, 5%, 10% 产品 (E-24 系列阻值):
第 1 位是 0, 第 2、3 位表示阻值的有效数 , 第 4 位表示有几个 0.

≤1% (E-96 series):
the 1st to 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following.
≤1% 产品 (E-96 系列阻值):
第 1~3 位表示阻值的有效数 , 第 4 位表示有几个 0.

Packing Type(包装类型):
A=Tape/Box (编带 / 盒装)
T=Tape/Reel (编带 / 卷装)
B=Bulk/Box (散装 / 盒装)
P=Tape/Box of PT-26 product
编带 (PT-26 产品) / 盒装

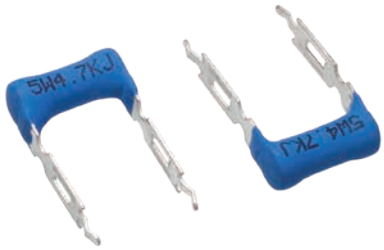
Packing Qty. (包装数量):
1=1,000pcs
2=2,000pcs
3=3,000pcs
4=4,000pcs
5=5,000pcs
A=500pcs
B=2,500pcs
0=Bulk/Box
(散装 / 盒装)

Additional Information(注):
0=NIL(标准品)

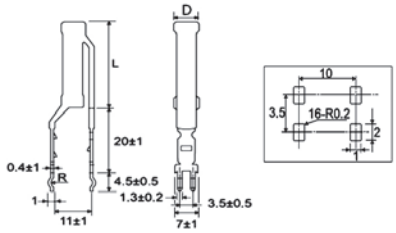
P=Panasert type	1=Avisert type 1
2=Avisert type 2	3=Avisert type 3
8=PT-58mm	9=PT-64mm
7=Lead wire(H)38mm	
A=PT-83mm	C=PT-73mm
D=PT-71mm	

Feature (特性)

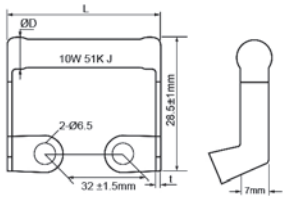
- Excellent flame retardant coating 优异不燃性涂装
- High Stability even in bad environment 恶劣环境下同样稳定工作
- High purity ceramic core 高纯度瓷芯
- High safety standard 电器性能稳定
- Meet EIAJ-RC2655A requirements 达到 EIAJ-RC2655A 标准要求
- Too low or too high ohmic value can be provided on a case to case basis
  超低或超高阻值也能特别提供



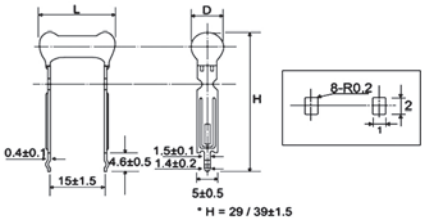
Vertical type - TMOV
端片 MOR 电阻-立式 (TMOV)



"L" type terminal - TMOL
端片 MOR 电阻-L型端片 (TMOL)



Radial type - TMOR
端片 MOR 电阻-卧式 (TMOR)



Specification(性能)

Part No 料号	Type 类型	Power Rating 功率 70°C	Dimension(尺寸) (mm)		MAX. Working Voltage 最大工作电压	MAX. Overlaod Voltage 最大过负荷电压	Resistance Range 阻值范围	Tolerance 精度 (%)
			L±1	D±1				
TMOV5W	TMOV-500	5W	20	7	500V	800V	≤ 10Ω	±10%
							10Ω~10KΩ	±5%
TMOV7W	TMOV-700	7W	30	7	500V	800V	≤ 10Ω	±10%
							10Ω~10KΩ	±5%
TMOLAW	TMOL-10W	10W	46Max 最大	10Max 最大	500V	800V	100Ω~82KΩ	±5%
TMOL13	TMOL-13W	13W	47	10	750V	1000V	100Ω~82KΩ	±5%
TMOR3W	TMOR-300	3W	16	6	350V	600V	≤ 10Ω	±10%
							10Ω~43KΩ	±5%
TMOR5W	TMOR-500	5W	18	7	500V	800V	≤ 10Ω	±10%
							10Ω~43KΩ	±5%

Ordering Procedure (Example: TMOV5W 5% 1KΩ B/B)
订购方式 (例如: TMOV5W 5% 1KΩ B/B)

T M O V 5 W J 0 1 0 2 B 0 0

Product Type (产品类型):
TMOV= Terminal type MOR-VERTICAL
端片类型MOR电阻-立式
TMOR= Terminal type MOR-RADIAL
端片类型MOR电阻-卧式
TMOL= Terminal type MOR-"L"type terminal
端片类型MOR电阻-"L"式

Wattage (功率):
3W=3W
5W=5W
7W=7W
AW=10W

Tolerance (公差):
J=±5% K=±10

Resistance Value (阻值):
5% & 10% (E-24 series):
the 1st digit is "0", the 2nd & 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following;
5%,10% 产品 (E-24 系列阻值):
第 1 位是 0, 第 2、3 位表示阻值的有效数 , 第 4 位表示有几个 0.

Packing Type(包装类型):
B=Bulk/Box (散装 / 盒装)

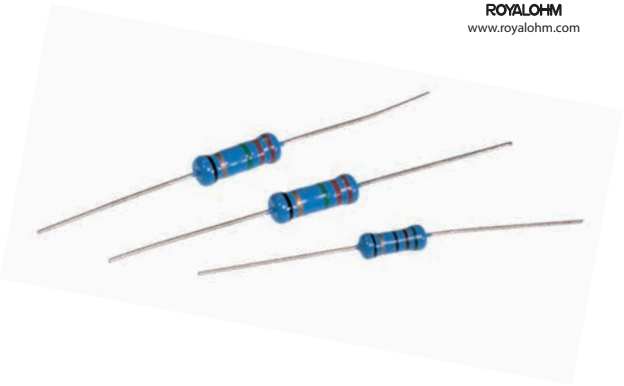
Packing Qty. (包装数量):
0=Bulk/Box
(散装 / 盒装)

Additional Information(注):
0=NIL(标准品)
L=TMOR H39mm

UNI-ROYAL 厚聲集團

Metal Glaze Film Fixed Resistors
金属玻璃釉膜固定电阻器

ROYALOHM
www.royalohm.com



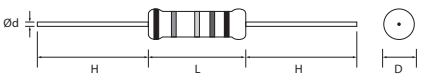
Feature (特性)

- Provide high stable performance against environment conditions & overload voltage
  耐高压，稳定性强，抗湿热高温环境
- Can withstand High Surge Voltage 可承受高浪涌电压
- Wide resistance range & low TCR 阻值范围宽，温度系数低
- VDE items available (File NO:40003686、A414、D708、A759)
  产品VDE 认证（认证号：40003686、A414、D708、A759）
- UL items available (File NO:20130925-E364163、E244546)
  产品UL安规 认证（认证号：20130925-E364163、E244546）

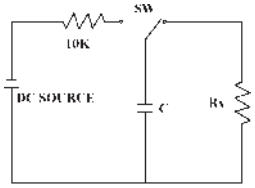
The tolerance ±5% has five color codes, and the last one is marked in black
公差 ±5% 有五道色码，最后一道以黑色标示

Tolerance ±1% with 5 color codes
公差 ±1% 有 5 道色码

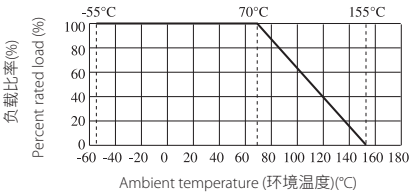
Dimension
(尺寸) mm



Surge Withstanding Voltage
(承受浪涌电压)



Derating Curve
(降功率曲线)



- Normal size: The discharge cycle is repeated in above circuit: 2.5 seconds"ON",2.5"OFF",50 cycles, C=0.001uf.
  正常尺寸：右图中充放电回路 :2.5 秒 " 通 "，2.5 秒 " 断 "，50 次循环，电容容值 C=0.001uf.
- Small Size: The discharge cycle is repeated in above circuit: 2.5 seconds"ON",2.5 seconds "OFF",10 cycles, C=0.01uf.
  小型化产品：右图中充放电回路 :2.5 秒 " 通 "，2.5S" 断 "，10 次循环，电容容值 C=0.01uf.
- The applied DC source voltage is shown as below table. 电路中的直流电压如下表 " 承受浪涌电压 " 所述 .

Specification(性能)

Part No 料号	Type 类型	Power Rating 功率 70 °C	Dimension (尺寸)(mm)				MAX. Working Voltage 最大工作电压	MAX. Overlaod Voltage 最大过负荷电压	Dielectric Withstanding Voltage 绝缘耐压	Surge Withstanding Voltage 浪涌电压	Resistance Range 阻值范围
			D	L	d ±0.05	H±3					
Normal Size(正常尺寸)											
MGR0W4	MGR-25	1/4W	2.2±0.5	6.5±1.0	0.60	28	1,600V	2,000V	700V	≥100KΩ 10000V	1KΩ~510MΩ (±5%,±10%) ≤10MΩ(±1%) 10M~100M(±2%)
MGR0W2	MGR-50	1/2W	3.5±0.6	9.5±1.0	0.60	28	3,500V	4,000V	700V		
MGR01W	MGR-100	1W	4.0±0.6	11.5±1.0	0.75	25	3,500V	4,000V	1000V		1KΩ~1GΩ (±5%,±10%) ≤10MΩ:±1% 10M~100M(±2%)
MGR02W	MGR-200	2W	5.0±0.6	15.5±1.0	0.80	28	3,500V	4,000V	1000V		
MGR03W	MGR-300	3W	6.0±0.6	17.5±1.0	0.80	28	3,500V	4,000V	1000V		1KΩ~100MΩ (±5%,±10%) 100K~1M(±1%)
Small Size&Ultra Small Size(小型尺寸)											
MGR0S2	MGR-50-S	1/2W-S	2.2±0.5	6.5±1.0	0.60	28	500V	700V	500V	100KΩ~1M:3000V 1M1~6M2: 4000V ≥6M8: 6000V	1KΩ~33MΩ (±5%,±10%) 100KΩ~1MΩ (±1%)
MGR01S	MGR-100-S	1W-S	3.5±0.6	9.5±1.0	0.60	28	700V	1000V	700V	100KΩ~1M:4000V 1M1~6M2: 5000V ≥6M8: 8000V	
MGR02S	MGR-200-S	2W-S	4.5±0.6	11.5±1.0	0.75	25	1000V	1400V	700V	100KΩ~1M:5000V 1M1~6M2: 6000V ≥6M8: 9000V	
MGR03U	MGR-300-SS	3W-SS	4.5±0.6	11.5±1.0	0.75	25	1000V	1400V	700V		
MGR03S	MGR-300-S	3W-S	5.0±0.6	15.5±1.0	0.80	28	1000V	1400V	700V	100KΩ~1M:8000V 1M1~6M2: 9000V ≥6M8: 10000V	

Performance Specification(性能)

Temperature coefficient	温度系数	≤±200PPM°C
Short-time Overload	短时间过负荷	ΔR/R ≤ ±(1%+0.05 Ω),with no evidence of mechanical damage (无可见机械损伤)
Dielectric withstanding voltage	绝缘耐压	With no evidence of flashover,mechanical damage,arcing or insulation breakdown (无击穿 · 飞弧及可可见机械损伤)
Pulse Overload	脉冲过负荷	ΔR/R ≤ ± (2%+0.05),with no evidence of mechanical damage (无可见机械损伤)
Terminal strength	端子强度	No evidence of mechanical damage (无可见机械损伤)
Soldering heat	耐焊接热	ΔR/R ≤ ±(1%+0.05 Ω) with no evidence of mechanical damage (无可见机械损伤)
Solderability	可焊性	Coverage must be over 95%.
Resistance to solvent	耐熔剂	No deterioration of protective coating and marking (包封层，色码完整)
Rapid change of temperature	温度快速变化	ΔR/R ≤ ±(1%+0.05 Ω) with no evidence of mechanical damage (无可见机械损伤)
Load life in humidity	湿度寿命	ΔR/R ≤ ±(5%+0.05 Ω) with no evidence of mechanical damage (无可见机械损伤)
Load life	负载寿命	ΔR/R ≤ ±(5%+0.05 Ω) with no evidence of mechanical damage (无可见机械损伤)
Surge Withstanding Voltage	尖峰脉冲	ΔR/R ≤ ±(20%+0.05 Ω) with no evidence of mechanical damage (无可见机械损伤)

Ordering Procedure (Example: MGR 1W 5% 27MΩ T/B-1000)

订购方式 (例如: MGR 1W 5% 27MΩ T/B-1000)

M G R 0 1 W J 0 2 7 6 A 1 0

Product Type (产品类型):
MGR=Metal Glaze Film Fixed Resistors
(金属玻璃釉膜固定电阻器)

Special Feature (特征):
O=Standard(标准品)

Wattage (功率):

W4=1/4W	S2=1/2W-S	W2=1/2W
1S=1W-S	1W=1W	2S=2W-S
2W=2W	3U=3W-SS	3S=3W-S
3W=3W		

Tolerance (公差):
F=±1% G=±2% J=±5%

Resistance Value (阻值):
5% & 10% (E-24 series):
the 1st digit is "0", the 2nd & 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following;
5%,10% 产品 (E-24 系列阻值):
第 1 位是 0, 第 2、3 位表示阻值的有效数 , 第 4 位表示有几个 0.
1%(E-24,E-96 Series)
The 1st to 3rd digits are for the significant figures of the resistance and the 4th digit denotes number of zeros following:
1% 产品 (E-24,E-96 系列阻值)
第 1~3 位表示阻值的有效数，第 4 位表示有几个 0.

Packing Type(包装类型):
A=Tape/Box (编带 / 盒装)
T=Tape/Reel (编带 / 卷装)
B=Bulk/Box (散装 / 盒装)
P=Tape/Box of PT-26 product
编带 (PT-26 产品) / 盒装

Packing Qty. (包装数量):
1=1,000pcs
2=2,000pcs
3=3,000pcs
4=4,000pcs
5=5,000pcs
A=500pcs
B=2,500pcs
0=Bulk/Box
(散装 / 盒装)

Additional Information(注):
0=NIL(标准品)
P=Panasert type 1=Avisert type 1
2=Avisert type 2 3=Avisert type 3
8=PT-58mm 9=PT-64mm
7=Lead wire(H)38mm
A=PT-83mm C=PT-73mm
D=PT-71mm

New/Old Part.no Contrast (新旧料号对照)

New Part.no 新料号	Old Part.no 旧料号
MGR0J*******	HMGR**J*******
MGR0J*******	HVR0**J*******
MGR*S2******	MGR*U2********

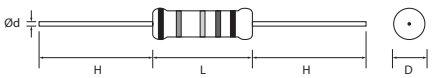
Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明 。

Fusible Resistors
保险丝电阻器

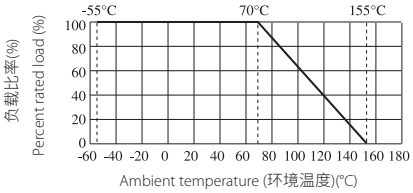
Feature (特性)

- Ideal circuit opening controller,disconnecting units from overload rating specified .
  理想的电流过负荷保护组件
- Too low or too high ohmic value can be supplied on a case to case to case basis.
  超高或超低阻值也能特别生产
- UL items available (File NO:E306074、E245468)
  产品UL安规认证 (认证号：E306074、E245468)

Dimension(尺寸) mm



Derating Curve (降功率曲线)



Specification(性能)

Part No 料号	Type 类型	Power Rating 功率 70°C	Dimension (尺寸)(mm)					Dielectric Withstanding Voltage 绝缘耐压	Resistance Range 阻值范围
			D	L	d ±0.05	H±3	PT		
FRN0W4	FRN-25	1/4W	2.2±0.5	6.5±1.0	0.60	28	52	300V	0.22Ω~10KΩ
FRN0S2	FRN-50-S	1/2W-S	2.2±0.5	6.5±1.0	0.60	28	52	300V	0.22Ω~10KΩ
FRN004	FRN-40	0.4W	2.2±0.5	6.5±1.0	0.60	28	52	300V	0.22Ω~10KΩ
FRN0W2	FRN-50	1/2W	3.0±0.5	9.0±1.0	0.60	28	52	350V	0.22Ω~10KΩ
FRN075	FRN-75	3/4W	3.5±0.6	9.5±1.0	0.54	28	52	350V	0.22Ω~10KΩ
FRN01W	FRN-100	1W	3.5±0.6	9.5±1.0	0.54	28	52	350V	0.22Ω~10KΩ
FRN01A	FRN-150	1.5W	4.5±0.6	11.5±1.0	0.70	25	52	600V	0.22Ω~10KΩ
FRN02W	FRN-200	2W	4.5±0.6	11.5±1.0	0.70	25	52	600V	0.22Ω~10KΩ
FRN03W	FRN-300	3W	5.0±0.6	15.5±1.0	0.80	28	64	600V	0.22Ω~10KΩ

Fusing Characteristics (熔断特性)

Resistance Value (阻值)	Test Wattage (测试功率)	Fusing Time (熔断时间)
≤2.2Ω	32 X Power Rating (额定功率)	≤ 60 seconds (秒)
>2.2Ω	16 X Power Ratring (额定功率)	≤ 60 seconds (秒)

The fusing test current or voltage should be stable, change within 5%. (测试电流或电压必须稳定变化率不超过 5%)

Performance Specification(性能)

Temperature coefficient	温度系数	±350PPM/℃
Short-time Overload	短时间过负荷	ΔR/R ≤ ±(2%+0.05 Ω),with no evidence of mechanical damage (无可见机械损伤)
Dielectric withstanding voltage	绝缘耐压	With no evidence of flashover,mechanical damage,arcing or insulation breakdown (无击穿 · 飞弧及可可见机械损伤)
Terminal strength	端子强度	No evidence of mechanical damage （无可见机械损伤)
Soldering heat	耐焊接热	ΔR/R ≤ ±(1%+0.05 Ω) with no evidence of mechanical damage (无可见机械损伤)
Solderability	可焊性	Coverage must be over 95%.
Rapid change of temperature	温度快速变化	ΔR/R ≤ ±(2%+0.05 Ω） with no evidence of mechanical damage （无可见机械损伤）
Load life in humidity	湿度寿命	ΔR/R ≤ ±(5%+0.05 Ω） with no evidence of mechanical damage （无可见机械损伤）
Load life	负载寿命	ΔR/R ≤ ±(5%+0.05 Ω） with no evidence of mechanical damage （无可见机械损伤）
Flame retardant	阻燃	Resistor insulation is self-extinguishing within 10 seconds after externally applied flame is removed （火焰移开后 10S 内，电阻自动绝燃，无可见火焰）

Ordering Procedure (Example: FRN 1W 5% 1Ω T/B-1000)

订购方式 (例如: FRN 1W 5% 1Ω T/B-1000)

F R N 0 1 W J 0 1 0 J A 1 0

Product Type (产品类型):
FRN=Fusible Resistors
(保险丝电阻器)

Special Feature (特征):
O=Standard(标准品)

Wattage (功率):
W4=1/4W W2=1/2W
1W=1W 2W=2W
3W=3W S2=1/2WS
04 = 0.4W 75=3/4W
1A=1.5W

Tolerance (公差):
G=±2% J=±5%
K=±10%

Resistance Value (阻值):
2%, 5%, 10% (E-24 series):
the 1st digit is "0", the 2nd & 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following;
2%, 5%, 10% 产品 (E-24 系列阻值):
第 1 位是 0, 第 2、3 位表示阻值的有效数 , 第 4 位表示有几个 0.
≤1% (E-96 series):
the 1st to 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following.
≤1% 产品 (E-96 系列阻值):
第 1~3 位表示阻值的有效数 , 第 4 位表示有几个 0.

Packing Type(包装类型):
A=Tape/Box (编带 / 盒装)
T=Tape/Reel (编带 / 卷装)
B=Bulk/Box (散装 / 盒装)

Packing Qty.
(包装数量):
1=1,000pcs
2=2,000pcs
3=3,000pcs
4=4,000pcs
5=5,000pcs
A=500pcs
B=2,500pcs
0=Bulk/Box
(散装 / 盒装)

Additional Information(注):
0=NIL(标准品)
P=Panasert type 1=Avisert type 1
2=Avisert type 2 3=Avisert type 3
8=PT-58mm 9=PT-64mm
7=Lead wire(H)38mm
A=PT-83mm C=PT-73mm
D=PT-71mm

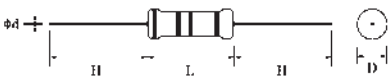
Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明 。

Wire-Wound Fixed Resistors
绕线型固定电阻器

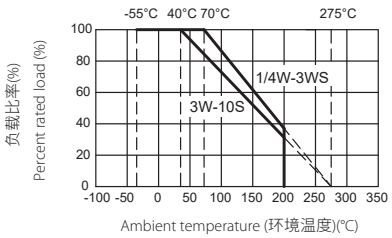
Feature (特性)

- Excellent flame retardant coating 优异不燃性涂装
- Too low or too high ohmic value can be supplied on a case to basis
  超低阻值或超高阻值都可特别提供
- Non-inductive type available
  可特别提供无感型产品

Dimension(尺寸) mm



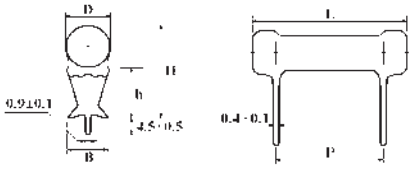
Derating Curve (降功率曲线)



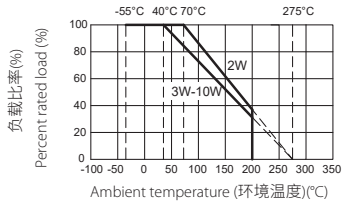
Specification(性能)

Part No 料号	Type 类型	Power Rating 功率 70°C	Dimension (尺寸)(mm)					Resistance Range 阻值范围
			D±1	L±1	d ±0.05	H±3	PT	
KNP0W4	KNP-25	1/4W	2.5	6.5	0.54	28	52	0.01Ω~200Ω
KNP0S2	KNP-50-S	1/2WS	2.5	6.5	0.54	28	52	0.01Ω~200Ω
KNP0W2	KNP-50	1/2W	3.0	9.5	0.54	28	52	0.01Ω~390Ω
KNP01S	KNP-100-S	1W-S	3.0	9.5	0.54	28	52	0.01Ω~390Ω
KNP01W	KNP-100	1W	4.5	11.5	0.70	25	52	0.01Ω~1.2KΩ
KNP02S	KNP-200-S	2W-S	4.5	11.5	0.70	25	52	0.01Ω~1.2KΩ
KNP02W	KNP-200	2W	5.5	15.5	0.70	28	64	0.01Ω~3.0KΩ
KNP03S	KNP-300-S	3W-S	5.5	15.5	0.70	28	64	0.01Ω~3.0KΩ
KNP03W	KNP-300	3W	6.5	17.5	0.75	28	64	0.039Ω~3.9KΩ
KNP05S	KNP-500-S	5W-S	6.5	17.5	0.75	28	64	0.039Ω~3.9KΩ
KNP05W	KNP-500	5W	8.5	24.5	0.75	38	90	0.082Ω~5.6KΩ
KNP07S	KNP-700-S	7W-S	8.5	24.5	0.75	38	90	0.082Ω~5.6KΩ
KNP07W	KNP-700	7W	8.5	29.5	0.75	38	B/B	0.1Ω~8.2KΩ
KNP08S	KNP-800-S	8W-S	8.5	29.5	0.75	38	B/B	0.1Ω~8.2KΩ
KNP08W	KNP-800	8W	8.5	39.5	0.75	38	B/B	0.15Ω~12KΩ
KNP09S	KNP-900-S	9W-S	8.5	39.5	0.75	38	B/B	0.15Ω~12KΩ
KNP09W	KNP-900	9W	8.5	52.5	0.75	38	B/B	0.22Ω~15KΩ
KNP0AS	KNP-1000-S	10W-S	8.5	52.5	0.75	38	B/B	0.22Ω~15KΩ

KNS Type (KNS型)

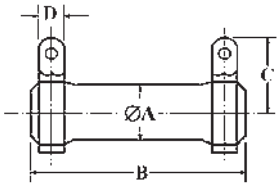


Derating Curve (降功率曲线)

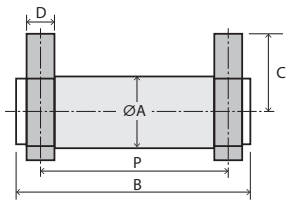


Part No 料号	Type 类型	Power Rating 功率 70°C	Dimension (尺寸)(mm)						Resistance Range 阻值范围
			D±1	L±1.5	P ±1.0	H±1.0	h±1.0	B±0.5	
KNS02W	KNS-200	2W	7.0	19.0	8	19	12	4.5	0.05Ω~470Ω
KNS03W	KNS-300	3W	7.0	21.0	10	19	13	4.5	0.068Ω~470Ω
KNS05W	KNS-500	5W	9.0	26.0	15	21.5	13	6.5	0.01Ω~750Ω
KNS07W	KNS-700	7W	9.0	31.0	20	21.5	13	6.5	0.1Ω~1.1KΩ
KNS08W	KNS-800	8W	9.0	41.0	32.5	21.5	13	6.5	0.2Ω~2.2KΩ
KNS0AW	KNS-1000	10W	9.0	54.0	43	21.5	13	6.5	0.3Ω~3.3KΩ

KNH Type (KNH型)



KNHA Type (KNHA型)



Part No 料号	Type 类型	Power Rating 功率 70°C	Dimension (尺寸)(mm)				Resistance Range 阻值范围
			A±1.5	B±1.5	C ±3	D±1	
KNH020	KNH-20W	20W	19	50	19	5	0.4Ω~10KΩ
KNH025	KNH-25W	25W	19	60	19	5	0.4Ω~10KΩ
KNH030	KNH-30W	30W	19	75	19	5	0.5Ω~15KΩ
KNH040	KNH-40W	40W	19	90	19	5	0.6Ω~20KΩ
KNH050	KNH-50W	50W	31 28	75	31	8	3Ω~25KΩ
KNH060	KNH-60W	60W	31 28	90	31	8	3Ω~30KΩ
KNH080	KNH-80W	80W	31 28	115	31	8	3Ω~40KΩ
KNH.....100	KNH-100W	100W	31 28	140	31	8	3Ω~50KΩ
KNHA25	KNHA-25W	25W	21	41	24	5	0.4Ω~10KΩ
KNHA30	KNHA-30W	30W	21	42	24	5	0.4Ω~10KΩ

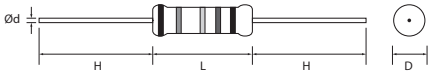
Wire-Wound Non-inductive Fixed Resistors

绕线无感电阻器

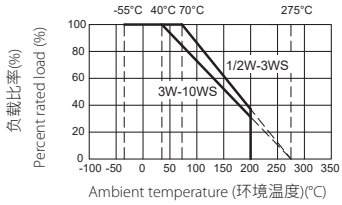
Feature (特性)

- Excellent flame retardant coating 优异不燃性漆
- Too low or too high ohmic value can be supplied on a case to case basis
  超低或超高阻值都可特别提供
- Non-inductive production process 无感的制作工艺

Dimension(尺寸) mm



Derating Curve (降功率曲线)



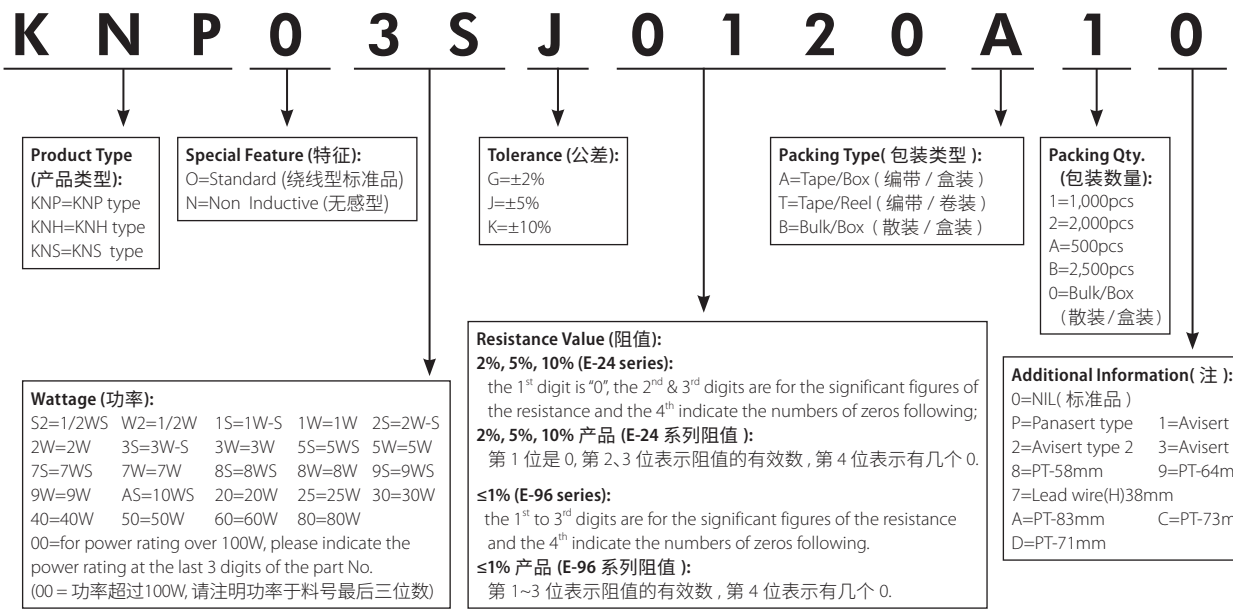
Part No 料号	Type 类型	Dimension (尺寸)(mm)					Resistance Range 阻值范围
		D±1	L±1	d±0.05	H±3	PT	
KNPNW2	KNPN-50	3.0	9.5	0.54	28	52	0.01Ω~30Ω
KNPN1S	KNPN-100-S	3.0	9.5	0.54	28	52	
KNPN1W	KNPN-100	4.0	11.5	0.70	25	52	0.01Ω~62Ω
KNPN2S	KNPN-200-S	4.0	11.5	0.70	25	52	
KNPN2W	KNPN-200	5.5	15.5	0.70	28	64	0.018Ω~120Ω
KNPN3S	KNPN-300-S	5.5	15.5	0.70	28	64	
KNPN3W	KNPN-300	6.5	17.5	0.75	28	64	0.024Ω~150Ω
KNPN5S	KNPN-500-S	6.5	17.5	0.75	28	64	
KNPN5W	KNPN-500	8.5	24.5	0.75	38	90	0.043Ω~430Ω
KNPN7S	KNPN-700-S	8.5	24.5	0.75	38	90	
KNPN7W	KNPN-700	8.5	29.5	0.75	38	B/B	0.047Ω~430Ω
KNPN8S	KNPN-800-S	8.5	29.5	0.75	38	B/B	
KNPN8W	KNPN-800	8.5	39.5	0.75	38	B/B	0.091Ω~620Ω
KNPN9S	KNPN-900-S	8.5	39.5	0.75	38	B/B	
KNPN9W	KNPN-900	8.5	52.5	0.75	38	B/B	0.13Ω~820Ω
KNPNAS	KNPN-1000-S	8.5	52.5	0.75	38	B/B	

Performance Specification(性能)

Temperature coefficient	温度系数	≥20 Ω：±300PPM/℃； ＜ 20Ω：±400PPM/℃
Short-time Overload	短时间过负荷	ΔR/R ≤ ±(2%+0.05 Ω)Max,with no evidence of mechanical damage (无可见机械损伤)
Terminal strength	端子强度	No evidence of mechanical damage （无可见机械损伤)
Soldering heat	耐焊接热	ΔR/R ≤ ±(1%+0.05 Ω)Max, with no evidence of mechanical damage (无可见机械损伤)
Solderability	可焊性	Coverage must be over 95%.
Load life in humidity	湿度寿命	ΔR/R≤ ±(5%+0.05 Ω)Max，with no evidence of mechanical damage (无可见机械损伤)
Load life	负载寿命	ΔR/R≤ ±(5%+0.05 Ω)Max，with no evidence of mechanical damage (无可见机械损伤)
Resistance to solvent	耐溶剂	No evidence of mechanical damage (无可见机械损伤)

Ordering Procedure (Example: KNP 3WS 5% 12Ω T/B-1000)

订购方式 (例如: KNP 3WS 5% 12Ω T/B-1000)



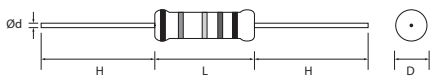
Wire-Wound Anti-Surge Fixed Resistors

绕线耐脉冲电阻器

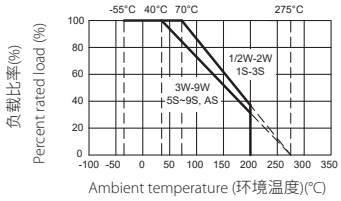
Feature (特性)

- Excellent flame retardant coating (优异不燃性涂装)
- According to IEC 61000-4-5 (符合 IEC61000-4-5 标准)
- Applies to electricity meters, home appliance and ballast (适用于电表、家电及整流器产品)

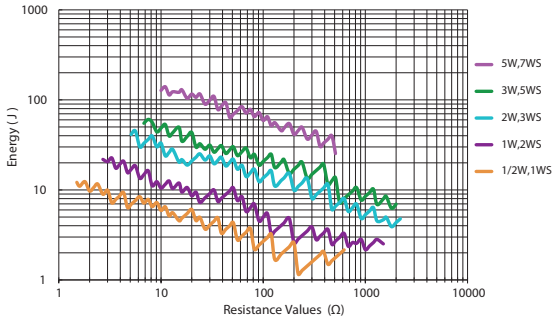
Dimension(尺寸) mm



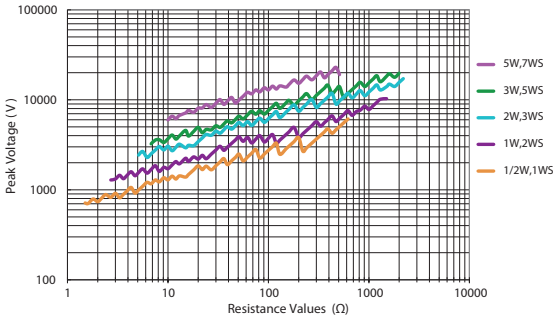
Derating Curve (降功率曲线)



KNPA Pulses Energy Curve (KNPA耐脉冲能量曲线)



KNPA Pulses Voltage Curve (KNPA耐脉冲电压曲线)



Part No 料号	Type 类型	Dimension (尺寸)(mm)					Resistance Range 阻值范围
		D±1	L±1	d±0.05	H±3	PT	
KNPAW2,01S	KNPA-50,KNPA-100-S	3.5	9.5	0.54	28	52	10Ω~820Ω
KNPA1W,02S	KNPA-100,KNPA-200-S	4.5	11.5	0.70	25	52	10Ω~1.2KΩ
KNPA2W,03S	KNPA-200,KNPA-300-S	5.5	15.5	0.70	28	64	10Ω~3.0KΩ
KNPA3W,05S	KNPA-300,KNPA-500-S	6.5	17.5	0.75	28	64	10Ω~3.9KΩ
KNPA5W,07S	KNPA-500,KNPA-700-S	8.5	24.5	0.75	38	90	10Ω~5.6KΩ
KNPA7W,08S	KNPA-700,KNPA-800-S	8.5	29.5	0.75	38	B/B	10Ω~8.2KΩ
KNPA8W,09S	KNPA-800,KNPA-900-S	8.5	39.5	0.75	38	B/B	10Ω~10KΩ
KNPA9W,AS	KNPA-900,KNPA-1000-S	8.5	52.5	0.75	38	B/B	10Ω~15KΩ

Performance Specification(性能)

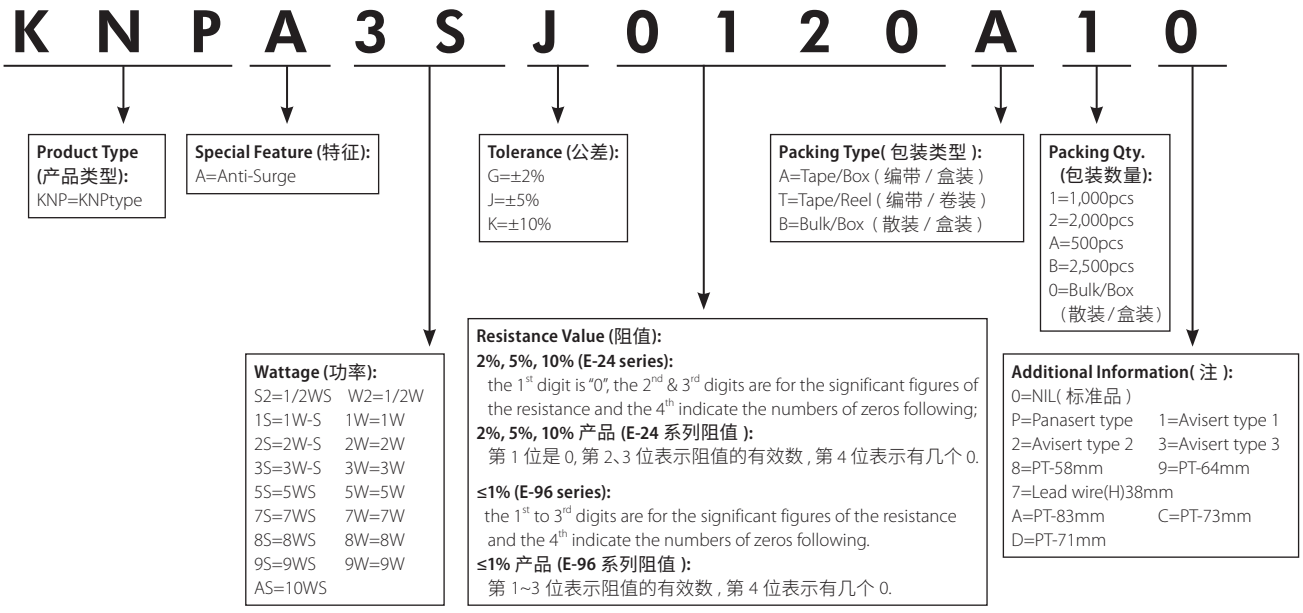
Temperature coefficient	温度系数	±200PPM/°C
Short-time Overload	短时间过负荷	ΔR/R±(2%+0.05Ω)MAX，with no evidence of mechanical damage (无可见机械损伤)
Terminal strength	端子强度	No evidence of mechanical damage (无可见机械损伤)
Soldering heat	耐焊接热	ΔR/R±(1%+0.05Ω)) MAX，with no evidence of mechanical damage (无可见机械损伤)
Solderability	可焊性	Coverage must be over 95%.
Rapid change of temperature	温度快速变化	ΔR/R±(2%+0.05Ω) MAX，with no evidence of mechanical damage (无可见机械损伤)
Load life in humidity	湿度寿命	ΔR/R±(5%+0.05Ω) MAX，with no evidence of mechanical damage (无可见机械损伤)
Load life	负载寿命	ΔR/R±(5%+0.05Ω) MAX，with no evidence of mechanical damage (无可见机械损伤)
Surge Immunity	脉冲测试	ΔR/R±(5%+0.05Ω) MAX
Resistance to solvent	耐溶剂	No evidence of mechanical damage (无可见机械损伤)

Surge Rating(脉冲标准)

Type 类型	Low Resistance Range 低阻值范围	Maximum Surge Voltage 最大脉冲电压	Medium Resistance Range 中阻值范围	Maximum Surge Voltage 最大脉冲电压	High Resistance Range 高阻值范围	Maximum Surge Voltage 最大脉冲电压
KNPA1/2W、1WS	10Ω~40Ω	2KV	43Ω~240Ω	3KV	270Ω~820Ω	4KV
KNPA1W、2WS	10Ω~50Ω	3KV	51Ω~240Ω	4KV	270Ω~1.2KΩ	5KV
KNPA2W、3WS	10Ω~100Ω	4KV	110Ω~240Ω	5KV	270Ω~3.0KΩ	6KV
KNPA3W、5WS	10Ω~100Ω	6KV	110Ω~680Ω	7KV	750Ω~3.9KΩ	8KV
KNPA5W、7WS	10Ω~160Ω	7KV	180Ω~680Ω	8KV	750Ω~5.6KΩ	9KV
KNPA7W、8WS	10Ω~160Ω	8KV	180Ω~680Ω	9KV	750Ω~8.2KΩ	10KV
KNPA8W、9WS	10Ω~160Ω	9KV	180Ω~680Ω	10KV	750Ω~10KΩ	10KV
KNPA9W、10WS	10Ω~160Ω	10KV	180Ω~680Ω	10KV	750Ω~15KΩ	10KV

Ordering Procedure (Example: KNPA 3WS 5% 12Ω T/B-1000)

订购方式 (例如: KNPA3WS 5% 12Ω T/B-1000)



New/Old Part.no Contrast (新旧料号对照)

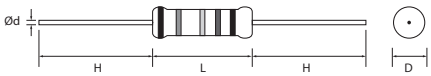
New Part.no 新料号	Old Part.no 旧料号
KNPA**J*******	KSR0**J*******

Wire-wound Fusible Resistors
绕线保险丝型电阻器

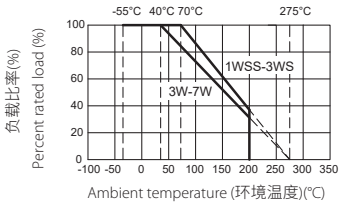
Feature (特性)

- Suitable for all kinds of protection circuit 适用各种保护电路
- Non-flammable coating,could withstand High Temperature
  优异不燃性涂装，耐高温
- Common resistor with additional safety function , no flame or smoke, no explosion or coating crack when fusing
  常见的电阻器具有额外的安全性能，无火焰或烟，无爆炸或涂层裂纹
- UL items available (File NO:E306074)
  产品 UL 安规认证 (认证号：E306074)

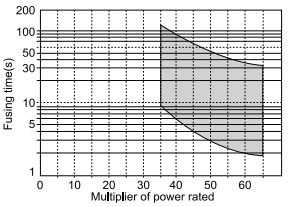
Dimension(尺寸) mm



Derating Curve (降功率曲线)



Fuseing Curve (熔断曲线)



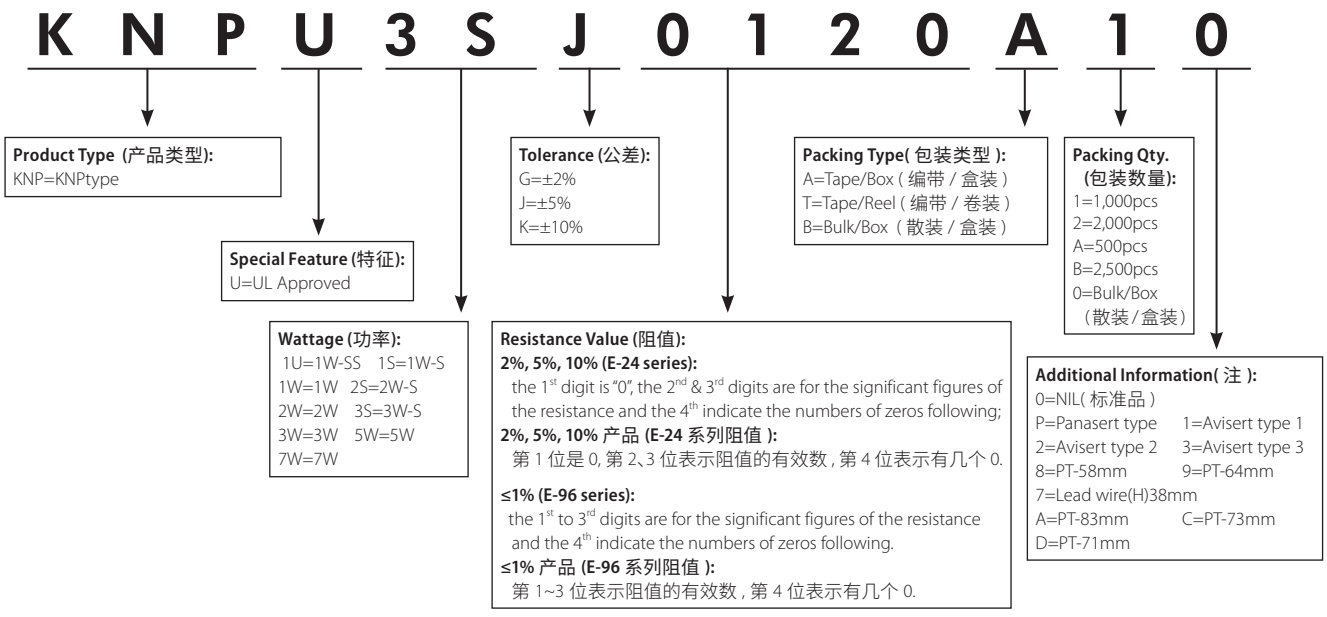
Part No 料号	Type 类型	Power Rating 功率 70 °C	Dimension (尺寸)(mm)					Resistance Range 阻值范围
			D(Max)	L(Max)	H±3	d±0.05	PT	
KNPU1U	KNPU1W-SS	1W-SS	3.0	8.5	28	0.54	52	10Ω
KNPU1S	KNPU1W-S	1W-S	4.3	9.0	28	0.60	52	0.47Ω~240Ω
KNPU1S	KNPU1W-S	1W-S	4.3	10.0	28	0.75	52	0.47Ω~240Ω
KNPU1W	KNPU100	1W	5.0	12.0	25	0.70	52	0.47Ω~240Ω
KNPU2S	KNPU2W-S	2W-S	5.0	12.0	25	0.70	52	0.47Ω~240Ω
KNPU2W	KNPU200	2W	5.5	16.0	28	0.70	64	0.47Ω~240Ω
KNPU3S	KNPU3W-S	3W-S	5.5	16.0	28	0.70	64	0.47Ω~240Ω
KNPU3W	KNPU300	3W	6.5	17.5	28	0.75	64	0.47Ω~240Ω
KNPU5W	KNPU500	5W	8.0	20.0	38	0.75	B/B	0.47Ω~240Ω
KNPU7W	KNPU700	7W	8.5	25.0	38	0.75	B/B	0.47Ω~47Ω

Performance Specification(性能)

Temperature coefficient	温度系数	≥20 Ω: ±300PPM/℃ <20 Ω: ±400PPM/℃
Short-time Overload	短时间过负荷	ΔR/R ≤±(2%±0.05Ω), with no evidence of mechanical damage (无可 见机械损伤)
Dielectric withstanding voltage	绝缘耐压	No evidence of flashover, mechanical damage.(1000V). 无击穿、飞弧及可见机械损伤 (1000V)
Terminal strength	端子强度	No evidence of mechanical damage (无可见机械损伤)
Soldering heat	耐焊接热	ΔR/R ≤±(1%±0.05Ω), with no evidence of mechanical damage (无可见机械损伤)
Solderability	可焊性	Coverage must be over 95%.
Load life in humidity	湿度寿命	ΔR/R ≤±(5%±0.05Ω), with no evidence of mechanical damage (无可见机械损伤)
Load life	负载寿命	ΔR/R ≤±(5%±0.05Ω), witn no evidence of mechanical damage (无可见机械损伤)

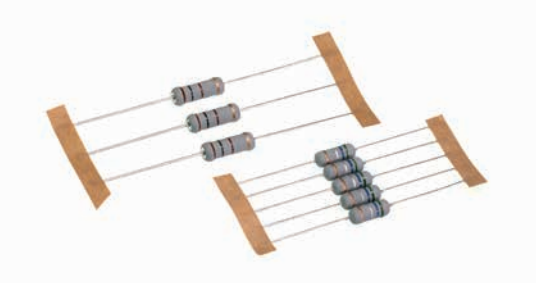
Ordering Procedure (Example: KNPU 3WS 5% 12Ω T/B-1000)

订购方式 (例如: KNPU3WS 5% 12Ω T/B-1000)

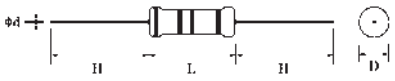


Feature (特性)

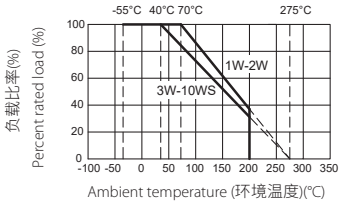
- Small body size 体积小
- High power 功率大
- Excellent flame retardant coating 优异的阻燃封装
- Provides stable performance in various environments
  在各种环境中提供优异的稳定性



Dimension(尺寸) mm

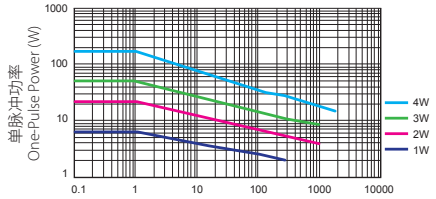


Derating Curve (降功率曲线)



Surge Withstanding Curve (脉冲曲线)

100ms Single Pulse Power-Value Chart (100ms 单脉冲曲线)



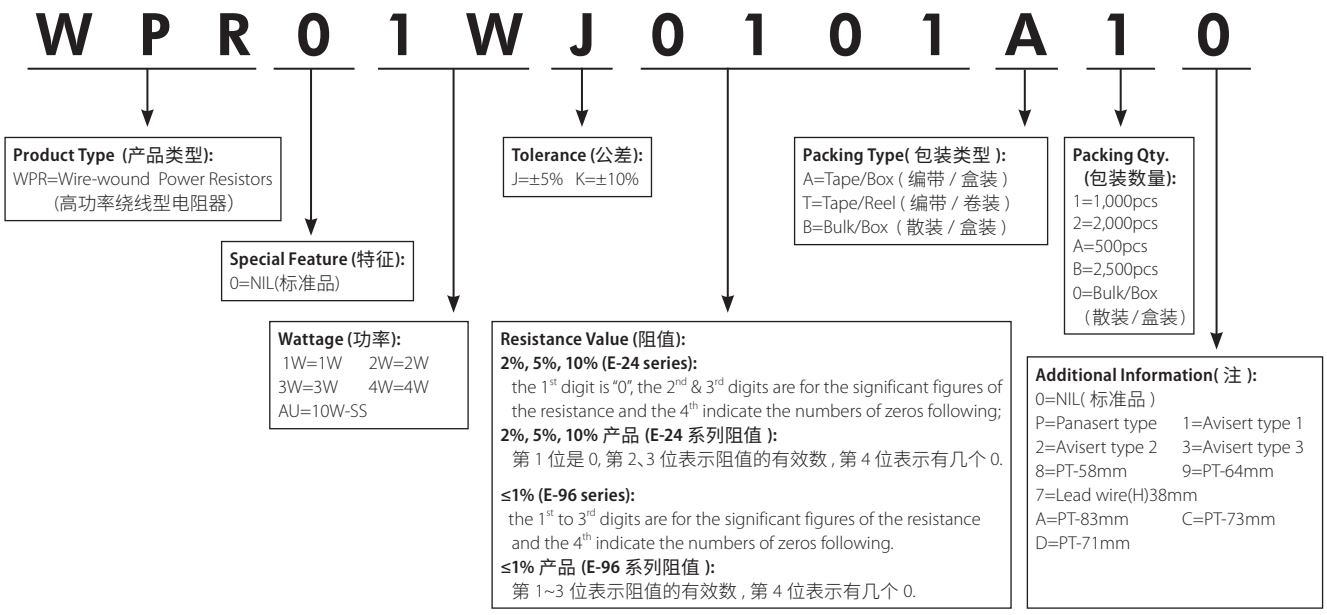
Part No 料号	Type 类型	Power Rating 功率 70°C	Dimension (尺寸)(mm)						Resistance Range 阻值范围
			D±1	L±1	d±0.05	H±3	Max Working Voltage 最大工作电压	Dieletric Withstand Voltage 绝缘耐压	
WPR01W	WPR-100	1W	2.5	6.2	0.60	28	50V	250V	0.1Ω~300Ω
WPR02W	WPR-200	2W	3.5	9.0	0.75	28	50V	250V	0.1Ω~1KΩ
WPR03W	WPR-300	3W	4.5	10.5	0.75	25	50V	350V	0.1Ω~1KΩ
WPR04W	WPR-400	4W	5.5	15.5	0.75	28	50V	350V	0.1Ω~1.8KΩ
WPR0AU	WPR-1000-SS	10W-SS	8.5	39.5	0.75	38	50V	350V	1Ω~5KΩ

Performance Specification(性能)

Temperature coefficient	温度系数	±200PPM/°C
Short-time Overload	短时间过负荷	ΔR/R≤±(5.0%+0.05Ω) with no evidence of mechanical damage (无可见机械损伤)
Terminal strength	端子强度	No evidence of mechanical damage (无可见机械损伤)
Soldering heat	耐焊接热	ΔR/R≤±(1.0%+0.05Ω) with no evidence of mechanical damage (无可见机械损伤)
Solderability	可焊性	Coverage must be over 95%.
Rapid change of temperature	温度快速变化	ΔR/R≤±(2.0%+0.05Ω) with no evidence of mechanical damage (无可见机械损伤)
Humidity (Steady State)	恒定湿热	ΔR/R≤±(2.0%+0.05Ω) with no evidence of mechanical damage (无可见机械损伤)
Pulse test	脉冲测试	ΔR/R≤±(5.0%+0.05Ω)
Resistance to solvent	耐溶剂	No deterioration of protective coating and markings (包封层，色码完整)
Load life in humidity	湿度寿命	ΔR/R≤±(5.0%+0.05Ω) Max. with no evidence of mechanical damage (无可见机械损伤)
Load life	负载寿命	ΔR/R≤±(5.0%+0.05Ω) Max. with no evidence of mechanical damage (无可见机械损伤)

Ordering Procedure (Example: WPR1W 5% 100Ω T/B-1000)

订购方式 (例如: WPR1W 5% 100Ω T/B-1000)



New/Old Part.no Contrast (新旧料号对照)

New Part.no 新料号	Old Part.no 旧料号
WPR01WJ**A*0**	KNP01UJ****A*0
WPR02WJ**A*0**	KNP02UJ****A*0
WPR03WJ**A*0**	KNP03UJ****A*0
WPR04WJ**A*0**	KNP04UJ****A*0
WPR0AUJ**A*0**	KNP0AUJ****A*0

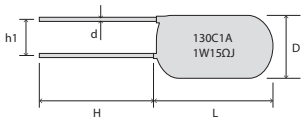
Thermal Fusing Wire-wound Fixed Resistors

绕线型温度保险丝电阻器

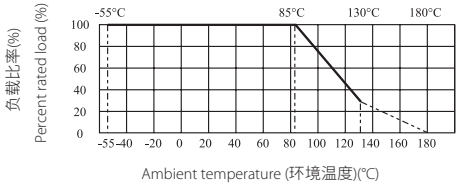
Feature (特性)

- Low resistance value with higher power dissipation 低阻值高功耗
- Wire-wound resistor with thermal fuse protection 绕线电阻热熔断保护
- Used in Electronic ballast ,other lighting applications
  一般用在电子整流器及其它照明用途

Dimension(尺寸) mm



Derating Curve (降功率曲线)



Type 类型	Power Rating 功率 70°C	Dimension (尺寸)(mm)											Resistance Range 阻值范围
		D	L	H (Min)	h1 (Min)	d±0.02	Current Rating	TF (°C)	TH/TC (°C)	TM (°C)	Ir	Ur	
TFR	1W	5.5±0.5	14±1	12	3.5	0.53	2A	130	102	180	2	250	2.2Ω~4.7Ω
TFR	1W	5.5 $^{+1}_{-0.5}$	11(Max)	12	3.5	0.53	1A	130	102	180	1	250	

Ordering Procedure (Example: TFR1W 5% 4.7Ω B/B)

订购方式 (例如: TFR1W 5% 4.7Ω B/B)

T F R 0 1 W J 0 4 7 J B 0 0

Product Type (产品类型):
TFR0=TFR

Wattage (功率):
1W=1W

Tolerance (公差):
J=±5% K=±10%

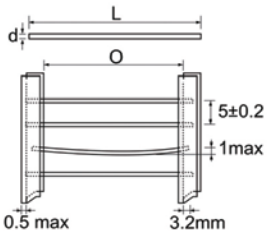
Resistance Value (阻值):
5% & 10% (E-24 series):
the 1st digit is "0", the 2nd & 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following;
5%,10% 产品 (E-24 系列阻值):
第 1 位是 0, 第 2、3 位表示阻值的有效数 , 第 4 位表示有几个 0.

Packing Type(包装类型):
B=Bulk/Box (散装 / 盒装)

Packing Qty. (包装数量):
0=Bulk/Box
(散装 / 盒装)

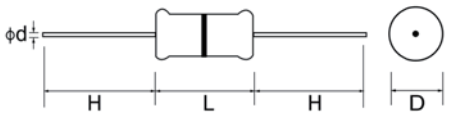
Additional Information(注):
0=Standard

ZW Type (ZW 型)

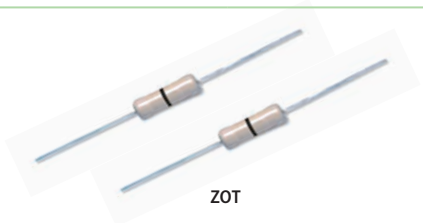


Part No 料号	Type 类型	L±3	d±0.05	O±1	
ZWA0	ZW-A	60/34	0.45	52	26
ZWB0	ZW-B	60/34	0.54	52	26
ZWB1	ZW-B1	60/34	0.60	52	26
ZWC0	ZW-C	60/34	0.70	52	26
ZWD0	ZW-D	60/34	0.75	52	26
ZWE0	ZW-E	60/34	1.00	52	26

ZO Type (ZO 型)



ZOC



ZOT

Part No 料号	Type	Power Rating 功率 70°C	Dimension (尺寸)(mm)				Resistance Range 阻值范围 (≤mΩ)
			D±0.3	L	d±0.05	H±3	
ZOT0W8/ZOCOW8	ZO-12	1/8W	1.9	3.3±0.3	0.45	28	ZOT：10 ZOC：50
ZOT0W4/ZOCOW4	ZO-25	1/4W	2.2	6.5±1.0	0.54	28	

Performance Specification(性能)

Lead material	引线材料	Tin-Plated copper（镀锡铜线）
Insulation resistance	绝缘阻值	Dry(干态)-10,000MΩ,Wet(湿态)-100MΩ
Dielectric withstanding voltage	绝缘耐压	Atmospheric（正常气压）-500V RMS; Reduced（减压）-325VRMS;
Rated current	额定电流	1/8W70°C 1.5A，1/4W 70°C 2.5A Derating to 0 Amps at 150°C 1/8W70°C 1.5A，1/4W 70°C 2.5A 150°C时，电流降低到 0A

Ordering Procedure (Example: ZOC 1/4W 0Ω T/R-5000)

订购方式 (例如: ZOC 1/4W 0Ω T/R-5000)

Z O C 0 W 4 0 0 0 0 0 0 T 5 0

Product Type (产品类型):
Zero Ohm Resistors(0Ω电阻)
ZOT0=0Ω(铁棒涂漆0Ω电阻)
ZOC0=0Ω(镀铜瓷棒0Ω电阻)
Jumper Wire(跳线）:
ZWA0=0.45mm ZWB0=0.54mm
ZWB1=0.60mm ZWC0=0.70mm
ZWD0=0.75mm ZWE0=1.0mm

Wattage (功率):
Zero Ohm Resistors(0Ω 电阻)
W8=1/8W
W4=1/4W
Jumper Wire(跳线):
00=NIL

Tolerance (公差):
0=NIL

Resistance Value (阻值):
Fill-in these 4digits with "0" specially 填 4 个 0 表示 0 阻值

Packing Type(包装类型):
A=Tape/Box (编带 / 盒装)
T=Tape/Reel (编带 / 卷装)
B=Bulk/Box (散装 / 盒装)
P=Tape/Box of PT-26 product
编带 /（PT-26 产品）盒装

Packing Qty. (包装数量):
5=5,000pcs
7=7,000pcs
8=8,000pcs
C=10,000pcs
0=Bulk/Box
（散装 / 盒装）

Additional Information(注):
0=NIL(标准品)

New/Old Part.no Contrast (新旧料号对照)

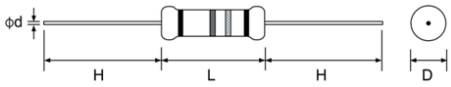
New Part.no 新料号	Old Part.no 旧料号
ZOC000000A*0**	CFR0**00000A*0
ZOT000000A*0**	ZO00**00000A*0

New Part.no 新料号	Old Part.no 旧料号
ZWB10000000A*0	ZWF00000000A*0
ZWE00000000A*0	ZWF00000000A*0

*M-type jumpers can be customized on request *M型跳線可特別提供

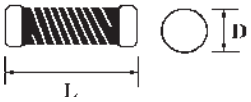
Copper Plated Steel Wire [铜包钢 (CP型)]

Tin Plated Copper Steel Lead Wire[镀锡铜包钢 (CT型)]



Part No 料号	Type 类型	Power Rating 功率 70°C	Dimension (尺寸)(mm)				MAX.Working Voltage 最大工作电压	MAX.Overlaod Voltage 最大过负荷电压	Dielectric Withstanding Voltage 绝缘耐压	Resistance Range 阻值范围
			D	L	d ±0.05	H±3				
CPXXW8/CTXXW8	CP/CT12	1/8W	1.9±0.3	3.3±0.3	0.54	28	200V	400V	400V	1Ω~10MΩ
CPXXW4/CTXXW4	CP/CT25	1/4W	2.2±0.5	6.5±1.0	0.54	28/38	250V	500V	500V	1Ω~10MΩ
CPXXS3/CTXXS3	CP/CT33-S	1/3W-S	2.2±0.5	6.5±1.0	0.54	28/38	300V	600V	500V	1Ω~10MΩ
CPXXW3/CTXXW3	CP/CT33	1/3W	3±0.5	9.0±1.0	0.54	28	300V	600V	700V	1Ω~10MΩ
CPXXS2/CTXXS2	CP/CT50-S	1/2W-S	3±0.5	9.0±1.0	0.54	28	350V	700V	700V	1Ω~10MΩ

Cutting Type (CO) [切割半成品型 (CO) 型]



Part No. 料号	Type 类型	Power Rating 功率 70°C	Dimension (尺寸)(mm)		Resistance Range 阻值范围
			D	L	
CO...W8	CO-12	1/8W	1.6 +0.10 -0.00	3.2 ±0.10	1Ω ~ 10MΩ
CO...W4	CO-25	1/4W	2.1 +0.09 -0.00	5.6 +0.10 -0.20	1Ω ~ 10MΩ
CO...W4...A	CO-25-A	1/4W	2.1 +0.09 -0.00	5.9 +0.10 -0.15	1Ω ~ 10MΩ
CO...W4...B	CO-25-B	1/4W	2.1 +0.09 -0.01	6.4 +0.10 -0.15	1Ω ~ 10MΩ

- Cutting type resistors are produced without lead-wire and without coating
  切割型半成品型电阻无导线，无涂装
- Cap plated option: 1. Tin-plated 2. Nickel-Plated
  铁帽：1 镀锡 2 镀镍

Ordering Procedure (Example: CTO 1/4W 5% 10Ω T/B-5000, CTO lead wire)

订购方式 (例如: CTO 1/4W 5% 10Ω T/B-5000, CTO导线)

C T O O W 4 J 0 1 0 0 A 5 0

Product Type (产品类型):
CPO=Copper plated steel lead wire
铜包钢线 (H=28mm)
CPL=Copper plated steel lead wire
铜包钢线 (H=38mm)
CTO=Tin Plated copper steel lead wire
镀锡铜包钢线 (H=28mm)
CTL=Tin Plated copper steel lead wire
镀锡铜包钢线(H=38mm)
COT= Cutting type (Tin-Plated Cap)
[切割型 (镀锡铁帽)]
CON= Cutting type (Nickel-Plated Cap)
[切割型 (镀镍铁帽)]

Special Feature (特征):
O=Standard(标准品)
F=Flame Retardant (阻燃型)
I=Non-Inductive (无感型)

Wattage (功率):
W8=1/8W
W4=1/4W
W3=1/3W
S3=1/3WS
S2=1/2WS

Tolerance (公差):
G = ±2%
J = ±5%
K = ±10%

Resistance Value (阻值):
2%, 5%, 10% (E-24 series):
the 1st digit is "0", the 2nd & 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following;
2%, 5%, 10% 产品 (E-24 系列阻值):
第 1 位是 0, 第 2、3 位表示阻值的有效数 , 第 4 位表示有几个 0.

≤1% (E-96 series):
the 1st to 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following.
≤1% 产品 (E-96 系列阻值):
第 1~3 位表示阻值的有效数 , 第 4 位表示有几个 0.

Packing Type(包装类型):
A=Tape/Box (编带 / 盒装)
T=Tape/Reel (编带 / 卷装)
B=Bulk/Box (散装 / 盒装)
P=Tape/Box of PT-26 product
编带 (PT-26 产品) / 盒装

Packing Qty. (包装数量):
1=1,000pcs,
2=2,000pcs
3=3,000pcs,
4=4,000pcs
5=5,000pcs,
A=500pcs
B=2,500pcs
0=Bulk/Box
(散装 / 盒装)

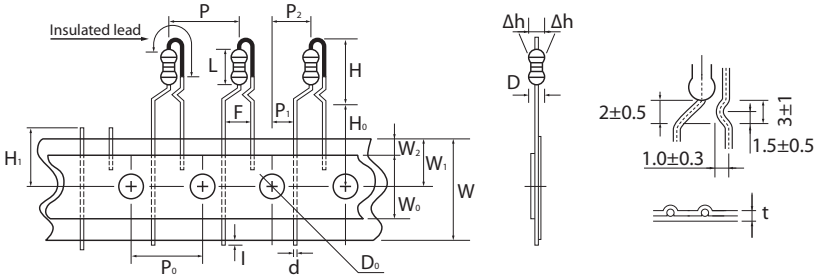
Additional Information(注):
0=CP/CT Type
A=Co-25-A,
B=CO-25-B

Feature (特性)

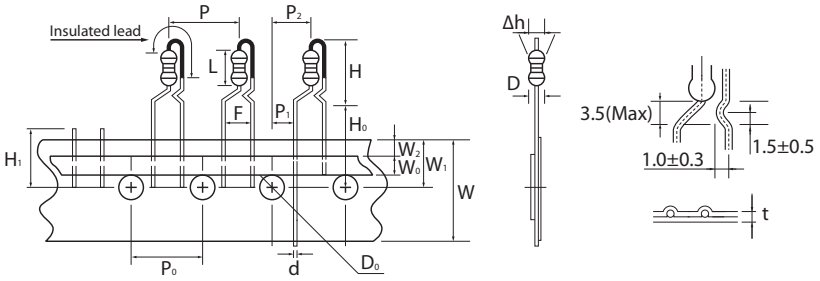
- This specification is applicable for CFR 1/4W,1/2W,1WS&CPR1/2W&MF1/4W,1/2WS,1/2W,1WS,2WS&MOR1/4W,1WS,2WS, KNP1/4W,1/2WS,1WS,2WS product only. KNP2WS product only; For other product (size), please consult factory for the available specification and drawing..

  下图规格适用于 CFR1/4W,1/2W,1WS&CPR1/2W&MF1/4W,1/2WS,1/2W,1WS,2WS&MOR1/4W,1WS,2WS,KNP1/4W,1/2WS,1WS,2WS. 其它产品的立 式加工，可洽询工厂以取得可生产的 规格图样。
- Standard product is insulated lead wire, insulated coating length 1/4W: 9.5±1mm; 1WS:13±1mm; 2WS:15±1mm
  标准品为绝缘引线，绝缘涂层长度为:
  1/4W: 9.5±1mm
  1WS: 13±1mm
  2WS: 15±1mm

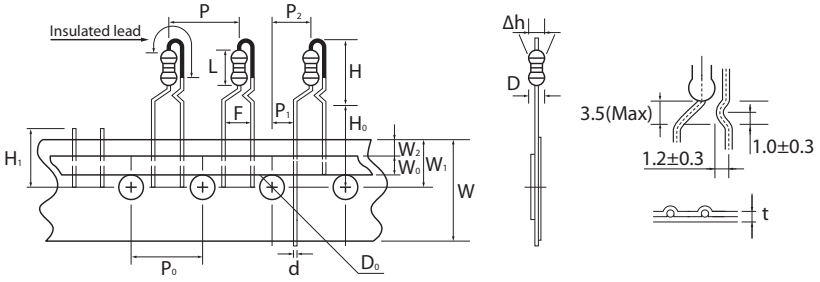
Panasert Type 1:



Panasert Type 1:



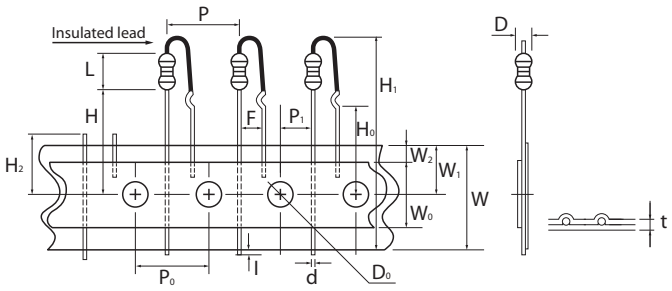
Panasert Type 2:



Items(项目)	Symbol	Dimension 尺寸 (mm)			
		1/4W	1/2WS	1WS	2WS
Body diameter 本体直径	D	2.5 (Max)	3±0.5	3.5±0.5	4±0.5
Body length 本体长度	L	6.8 (Max)	9±1	9±1	11.5±1
Body height 本体高度	H	12 (Max)	17 (Max)	19 (Max)	21 (Max)
Lead-wire diameter 导线直径	d	0.60±0.05	0.60±0.05	0.70±0.05	0.70±0.05
Pitch of component 零件间距	p	12.7±1	12.7±1	12.7±1	12.7±1
Feed hole pitch 孔距	P0	12.7±0.3	12.7±0.3	12.7±0.3	12.7±0.3
Hole center to lead 中心测量	P1	3.85±0.7	3.85±0.7	3.85±0.7	3.85±0.7
Hole center to body 孔心至本体	P2	6.35±1.3	6.35±1.3	6.35±1.3	6.35±1.3
Lead to lead distance 两脚导线中心测量	F	5±1	5±1	5±1	5±1
Component aligment 零件偏移	Δh	0±1	0±1	0±1	0±1
Tape width 纸带宽度	W	18±1	18+1/-1.5	18+1/-1.5	18+1/-1.5
Sticky tape width 热熔胶带宽	W0	12.5 (Min)	/	12.5 (Min)	12.5 (Min)
		6 (min)	6±0.2	6±0.2	6±0.2
Hole position 孔位	W1	9±0.5	9+0.75/-0.5	9+0.75/-0.5	9+0.75/-0.5
Uncovered paper tape width 纸带露出宽度	W2	1.5 (Max)	1.5 (Max)	1.5 (Max)	1.5 (Max)
Lead –wire clinch height 导线固定高度	H0	16.5 (Max)	16±0.5	16±0.5	16±0.5
Length of snipped lead 导线剪断高度	H1	11 (Max)	11 (Max)	11 (Max)	11 (Max)
Feed hole diameter 孔径	D0	4±0.3	4±0.3	4±0.3	4±0.3
Total tape thickness 胶带厚度	t	0.5±0.2	0.5±0.2	0.5±0.2	0.5±0.2
Lead wire protrusion 导线露出	i	1Max	-	-	-
Length of lead cut 切脚的长度	H1-w1	2±0.5	2±0.5	2±0.5	2±0.5

Avisert(1) Type【Avisert(1)型】

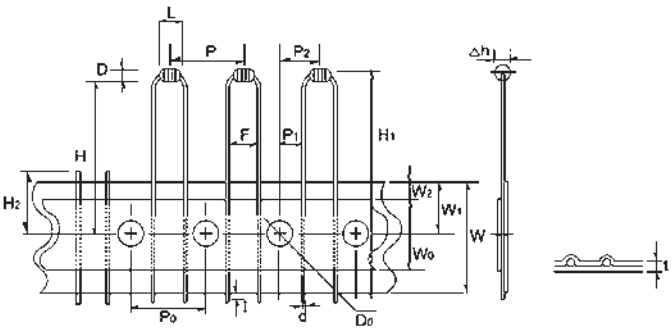
- This specification is applicable for CFR1/4W,CPR1/2W&MF1/4W,1/2WS,0.6WS,MOR1/4W,1/2WS,product only; For other product (size), please consult factory for the specification and drawing.
  适用于 CFR1/4W, CPR1/2W & MF1/4W, 1/2WS, 0.6WS, MOR1/4W, 1/2WS 固定电阻。其它产品的立式加工，可洽询工厂以取得可生产的规格图样。
- Standard product is insulated lead wire,insulated coating length 9.5±1mm
  标准品为绝缘引线，绝缘涂层长度为 : 9.5±1mm。



Items (项目)	Symbol	Dimension 尺寸 (mm) 1/4W
Body diameter 本体直径	D	2.5 (Max)
Body length 本体长度	L	6.8 (Max)
Lead-wire diameter 导线直径	d	0.60±0.05
Pitch of component 零件间距	p	12.7±1
Feed hole pitch 孔距	P0	12.7±0.3
Hole center to lead 中心测量	P1	3.85±0.7
Lead to lead distance 两脚导线中心测量	F	5±1
Tape width 纸带宽度	W	18±1
Sticky tape width 热熔胶带宽	W0	12.5 (Min)
		6 (min)
Hole position 孔位	W1	9.5±0.5
Uncovered paper tape width 纸带露出宽度	W2	3.0 (Max)
Height of component from tape center 零件至纸带中间的宽度	H	17.3±0.5
Lead –wire clinch height 导线固定高度	H0	16.5 (Max)
Component height 零件高度	H1	34.5 (Max)
Length of snipped lead 导线剪断高度	H2	11 (Max)
Feed hole diameter 孔径	D0	4±0.3
Total tape thickness 胶带厚度	t	0.5±0.2
Lead wire protrusion 导线露出	i	1 (Max)

Avisert(2) Type【Avisert(2)型】

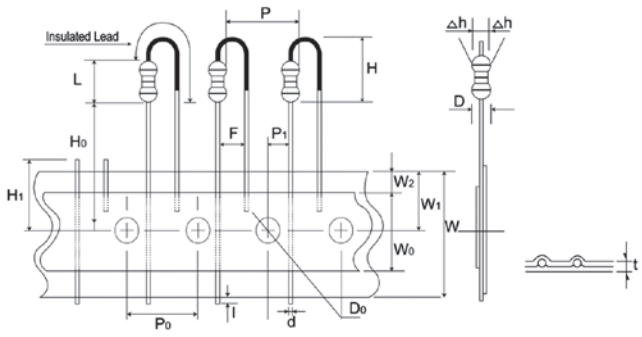
- This specification is applicable for CFR1/8W, 1/4WS&MF1/8W, 1/4WS product only; For other product avaiable forming products, please consult factory for the specification and drawing.
  适用于 CFR1/8W, 1/4WS&MF1/8W, 1/4WS 固定电阻。其它产品的立式加工，可洽询工厂以取得可生产的规格图样。



Items (项目)	Symbol	Dimension 尺寸 (mm) 1/8W
Body diameter 本体直径	D	1.85 (Max)
Body length 本体长度	L	3.5 (Max)
Lead-wire diameter 导线直径	d	0.45±0.05
Pitch of component 零件间距	p	12.7±1
Feed hole pitch 孔距	P0	12.7±0.3
Hole center to lead 中心测量	P1	3.85±0.7
Hold center to component center 孔心至零件中心距离	P2	6.35±1.3
Lead to lead distance 两脚导线中心测量	F	5±1
Tape width 纸带宽度	W	18±1
Sticky tape width 热熔胶带宽	W0	6 (Min)
Hole position 孔位	W1	9.0±0.5
Uncovered paper tape width 纸带露出宽度	W2	3.0 (Max)
Lead wire protrusion 打弯处到纸带中心位置	H	21.25 (Max)
Component height 零件高度	H1	32.25 (Max)
Length of snipped lead 导线剪断高度	H2	11 (Max)
Feed hole diameter 孔径	D0	4±0.3
Total tape thickness 胶带厚度	t	0.5±0.2
Lead wire protrusion 导线露出	i	1 (Max)

Avisert(3) Type【Avisert(3)型】

- This specification is applicable for CFR1/8W, CFR1/4WS, MF1/8W, MF1/4WS, MF1/4W, MF1/2WS, MF0.6WS, MOR1/4W, MOR1/2WS. For other product (size), please consult factory for the specification and drawing.
  下图规格适用于 CFR1/8W,CFR1/4WS,MF1/8W,MF1/4WS,MF1/4W,MF1/2WS,MF0.6WS,MOR1/4W,MOR1/2WS ; 其它产品的立式加工，可洽询工厂以取得可生产的规格图样 .
- Standard product is insulated lead wire,insulated coating length 9.5±1mm.
  标准品为绝缘引线，绝缘涂层长度为：9.5±1mm.



Items (项目)	Symbol	Dimension 尺寸 (mm)	
		1/8W	1/4W
Body diameter 本体直径	D	2.0 (Max)	2.5 (Max)
Body length 本体长度	L	4.2 (Max)	6.8 (Max)
Lead-wire diameter 导线直径	d	0.45±0.05	0.60±0.05
Pitch of component 零件间距	p	12.7±1	12.7±1
Feed hole pitch 孔距	P0	12.7±0.3	12.7±0.3
Hole center to lead 中心测量	P1	3.85±0.7	3.85±0.7
Lead to lead distance 两脚导线中心测量	F	2.5±1	5±1
Tape width 纸带宽度	W	18±1	18±1
Sticky tape width 热熔胶带宽	W0	6min	6min
Hole position 孔位	W1	9.0±0.5	9.0±0.5
Uncovered paper tape width 纸带露出宽度	W2	3.0 (Max)	3.0 (Max)
Body height 本体高度	H	7.0 (Max)	10.0 (Max)
Lead –wire clinch height 导线固定高度	H0	20.0 (Max)	16.0 (Max)
Component aligment 零件偏移	Δh	0±1	0±1
Length of snipped lead 导线剪断高度	H1	11 (Max)	11 (Max)
Feed hole diameter 孔径	D0	4±0.3	4±0.3
Total tape thickness 胶带厚度	t	0.5±0.2	0.5±0.2
Lead wire protrusion 导线露出	i	1 (Max)	1 (Max)

Ordering Procedure (Example: CFR1/4W 5% 100KΩ T/B-2000 PANASERT Type)

订购方式 (例如: CFR1/4W 5% 100KΩ T/B-2000 PANASERT Type)

C F R 0 W 4 J 0 1 0 4 A 2 P

Product Type (产品类型):
CFR = Carbon Film Fixed Resistors (碳膜固定电阻器)
MF = Metal Film Fixed Resistors (金属膜固定电阻器)
MOR= Metal Oxide Film Fixed Resistors (金属氧化膜固定电阻器)

Special Feature (特征):
O=Standard(标准品)
I=Non-Inductive (无感型)

Wattage (功率):
W8=1/8W
W4=1/4W
W2=1/2W
S4=1/4W-S
S2=1/2W-S
06=0.6W-S

Tolerance (公差):
G=2% J=±5%
K=±10%

Resistance Value (阻值):
2%, 5%, 10% (E-24 series):
the 1st digit is "0", the 2nd & 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following;
2%, 5%, 10% 产品 (E-24 系列阻值):
第 1 位是 0, 第 2、3 位表示阻值的有效数 , 第 4 位表示有几个 0.
≤1% (E-96 series):
the 1st to 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following.
≤1% 产品 (E-96 系列阻值):
第 1~3 位表示阻值的有效数 , 第 4 位表示有几个 0.

Packing Type(包装类型):
A=Tape/Box (编带 / 盒装)
T=Tape/Reel (编带 / 卷装)

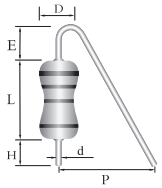
Packing Qty. (包装数量):
2=2,000pcs(T/B only)(限 T/B)
5=5,000pcs(T/R only)(限 T/R)
T/R is 2500PCS per reel &2reels per box (T/R 是每卷 2,500pcs, 每盒 2 卷)

Additional Information(注):
P=Panasert type 1
Q=Panasert type 2
1= Avisert type 1
2= Avisert type 2
3= Avisert type 3

M & F & T Forming Type

M & F & T 型（成型）

F Forming Type (F 型)

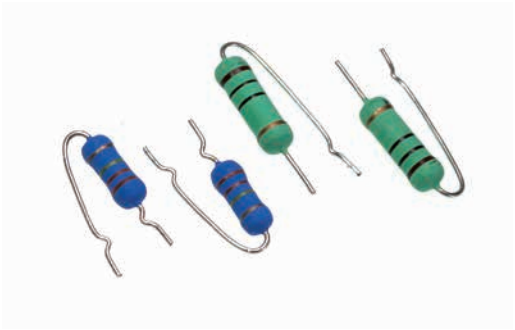


F Type (F 型)

F1 Type (F1 型)

F2 Type (F2 型)

F3 Type (F3 型)

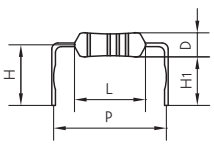


Dimension (尺寸) (mm)

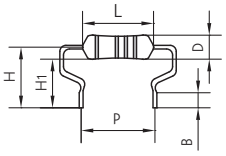
Power Rating 功率	L Max. L 最大	D Max. D 最大	d ± 0.05	P +1 -3	H ± I	E ± 0.5
I W (2W-S)	12	5.0	0.70	8	6	2.5
2 W (3W-S)	16	5.5	0.70	8	6	2.5

M Forming Type (M 型)

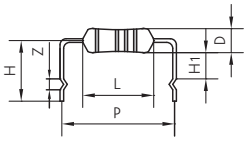
MB Type (MB 型)



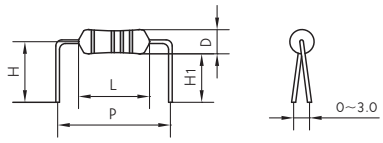
MC Type (MC 型)



MK Type (MK 型)



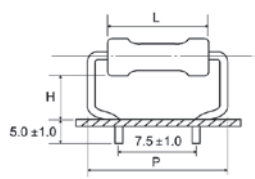
M Type (M 型)

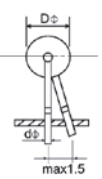


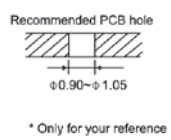
Power Rating 功率 70°C	L(Max)	D(Max)	d±0.05	H±2	P±1.5
1/2W & 1WS	10	4	0.70	14	13
1W & 2WS	12	5	0.70	14	15
2W & 3W-S	16	5.5	0.70	18	20
3W & 5WS	17.5	6.5	0.75	20	25
5W	26	8.5	0.75	20	31

T Forming Type (T 型)

Power Rating 功率 70°C	L(Max)	D(Max)	d±0.05	P(Max)	H +1 -0
1W-S	10	3.5	0.70	12.5	8
1W(2W-S)	12	5.0	0.70	15	8
2W(3W-S)	16	55	0.70	20	9







Ordering Procedure (Example: MOR1WS 5% 10Ω B/B M Type with flattened lead wire)

订购方式 (例如: MOR1WS 5% 10Ω B/B M 型导线打扁)

M O R 0 1 S J 0 1 0 0 B M F

Product Type (产品类型):
MOR=Metal Oxide Film Fixed Resistors
(金属氧化膜固定电阻器)
CFR=Carbon Film Fixed Resistors
(碳膜固定电阻器)

Special Feature (特征):
O=Standard(标准品)
I=Non-Inductive (无感型)

Wattage (功率):
W2=1/2W 1W=1W
2W=2W 3W=3W
5W=5W 1S=1W-S
2S=2W-S 3S=3W-S
5W=5W-S

Tolerance (公差):
G=2% J=±5% K=±10%

Resistance Value (阻值):
5% & 10% (E-24 series):
the 1st digit is "0", the 2nd & 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following;
5%,10% 产品 (E-24 系列阻值):
第 1 位是 0, 第 2、3 位表示阻值的有效数 , 第 4 位表示有几个 0.

2% (E-96 series):
the 1st to 3rd digits are for the significant figures of the resistance and the 4th indicate the numbers of zeros following.
2% 产品 (E-96 系列阻值):
第 1~3 位表示阻值的有效数 , 第 4 位表示有几个 0.

Packing Type(包装类型):
B=Bulk/Box (散装 / 盒装)

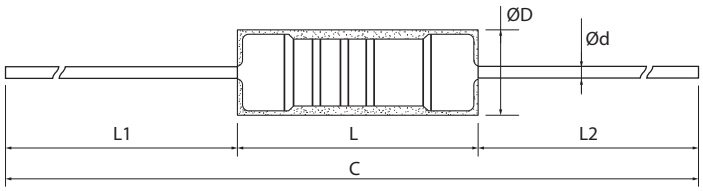
Additional Information(注):
F0=F Type (F 型) F1=F1 Type (F1 型)
F2=F2Type (F2 型) F3=F3 Type (F3 型)
T0=T Type (T 型)
MF=M Type with flattened lead wire
M 型导线打扁
MC=M Type with bending lead wire
M 型导线打弯曲
MK=M Type with kinked lead wire
M 型导线打弯折
ML=M Type with normal lead wire
M 型导线直线

Feature (特性)

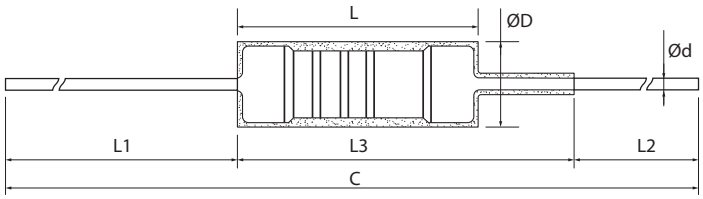
- Used for insulation protection and fusing protection of wire-wound (fusible) resistor.
  用于涂装产品的绝缘防护及绕线 (保险丝) 电阻的熔断防护。
- This specification is applicable for KNP、KNPU product only. For the other products (size), please consult factory for the available specification and drawing..
  适用于 KNP、KNPU 的产品，其他产品请洽谈工厂取得可生产的规格图样。

TZ Forming Type (TZ 轴向套管)

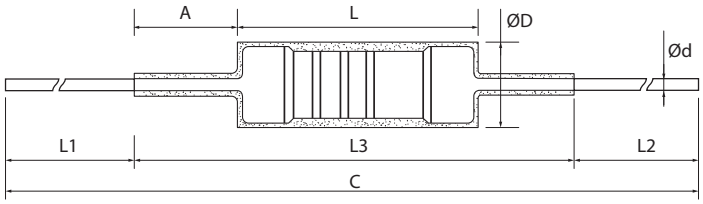
TZ-1 Wrapped resistor body only
TZ-1套管包电阻本体



TZ-2 Wrapped resistor body and lead one side only
TZ-2套管包电阻本体及一边导线



TZ-3 Wrapped resistor body and lead both two side
TZ-3套管包电阻本体及两边导线

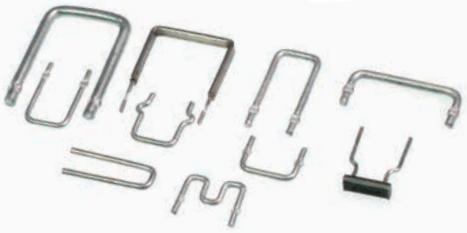


Dimension (尺寸) (mm)

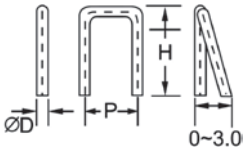
Type 类型	Forming type 加工形态	Dimension (尺寸)(mm) (L1、L2、L3 Adjustable range 可调范围)							
		D±1	L±1	L1	L2	L3	Ød±0.05	A (Max.)	C (Max.)
1/4W、1/2W、1WSS	TZ-1	2.5	6.5	38	25	/	0.54	/	Max.68mm
	TZ-2			38	2Min.	40Max.		/	
	TZ-3			2Min.	2Min.	40Max.		33	
1/2W、1WS、2WSS	TZ-1	3.5	9.5	38	25	/	0.54	/	Max.71mm
	TZ-2			38	2Min.	40Max.		/	
	TZ-3			2Min.	2Min.	40Max.		30	
1W、2WS、3WSS	TZ-1	4.5	11.5	38	25	/	0.70	/	Max.73mm
	TZ-2			38	2Min.	40Max.		/	
	TZ-3			2Min.	2Min.	40Max.		28	
2W、3WS、4WSS	TZ-1	5.5	15.5	38	25	/	0.70	/	Max.77mm
	TZ-2			38	2Min.	40Max.		/	
	TZ-3			2Min.	2Min.	40Max.		25	

Feature (特性)

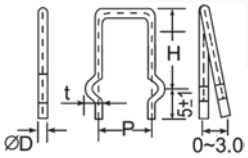
- Made by Cu/Ni or Mn/Cu Alloy resistance wire materials
  由铜 / 镍或锰 / 铜合金电阻线制成
- Excellent Solderability 优越的焊接性能
- Suitable for all kinds of Current sense application
  适用于各种类型的电流感应器应用
- Application: Power Supply 电源供应



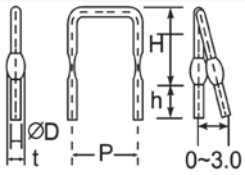
CSRA Type- CSRA 型



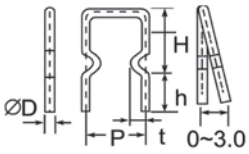
CSRB Type- CSRB 型



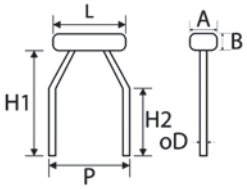
CSRC Type- CSRC 型



CSRD Type- CSRD 型



CSRE Type- CSRE 型



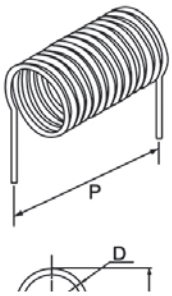
Specification(性能)

Type 类型	ΦD 线径	Rated Current 额定电流	Resistance Range 阻值范围	TCR	Remark 备注
CSRA CSRB CSRC CSRD	Φ0.8mm	4.5A	5mΩ~50mΩ	±100PPM/℃	*P&H could be design by customer's requirement P 值和 H 值可根据客户的要求进行设计 *Temperature coefficient of resistor could be design by customer's requirement 温度系数可根据客户的要求进行设计
	Φ0.9mm	5.0A	5mΩ~40mΩ		
	Φ1.0mm	5.5A	3mΩ~30mΩ		
	Φ1.1mm	6.0A	3mΩ~20mΩ		
	Φ1.2mm	7.0A	3mΩ~20mΩ		
	Φ1.3mm	7.5A	3mΩ~20mΩ		
	Φ1.4mm	8.0A	3mΩ~20mΩ		
	Φ1.5mm	9.0A	3mΩ~20mΩ		
	Φ1.6mm	9.5A	3mΩ~15mΩ		
	Φ1.8mm	11A	3mΩ~10mΩ		
	Φ2.0mm	12A	3mΩ~10mΩ		
	Φ2.3mm	14A	3mΩ~7mΩ		
CSRE	Φ1.0mm	50A	1mΩ		

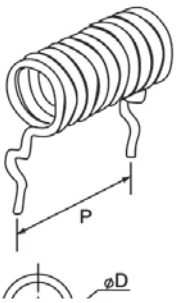
Feature (特性)

- Made by Cu/Ni or Mn/Cu Alloy resistance wire materials
  由铜 / 镍或锰 / 铜合金电阻线制成
- Excellent Solderability 优越的焊接性能
- Suitable for all kinds of Current sense application
  适用于各种类型的电流感应器应用
- Application: Power Supply 电源供应

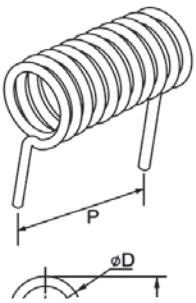
CSSA Type- CSSA 型



CSSB Type- CSSB 型



CSSC Type- CSSC 型



Type 类型	ΦD 线径	Rated Current 额定电流	Resistance Range 阻值范围	Remark 备注
CSSA CSSB CSSC	Φ0.8mm	4.5A	5mΩ~50mΩ	*P&H could be design by customer's requirement *P 值和 H 值可根据客户的要求进行设计
	Φ1.0mm	5.5A	3mΩ~30mΩ	
	Φ1.6mm	9.5A	3mΩ~15mΩ	
	Φ2.0mm	12A	3mΩ~10mΩ	

Ordering Procedure (Example: CSRC Φ1.5mm 10mΩ±5% B/B)

订购方式 (例如: CSRC Φ1.5mm 10mΩ±5% B/B)

C S R C 1 5 J 0 1 0 L B 0 0

Type (产品类型):
CSRA = CSRA type
CSRB = CSRB type
CSRC = CSRC type
CSRD = CSRD type
CSRE = CSRE type
CSSA = CSSA type
CSSB = CSSB type
CSSC = CSSC type

Wire Ø (线径 Ø):
08=Ø0.8 10=Ø1.0
12=Ø1.2 15=Ø1.5
16=Ø1.6 20=Ø2.0
23=Ø2.3

Tolerance (公差):
J=±5% K=±10%

Resistance Value (阻值):
2%, 5% (E-24 series): the 1st digit is "0"; the 2nd & 3rd digits are for the significant figures of the resistance and the 4th digit denotes number of zeros following.
2%, 5%产品 (E-24系列电阻): 第1位是0，第2,3位表示阻值的有效数，第4位表示有几个0.
≤1%(E-96 Series)
the 1st to 3rd digits are for the significant figures of the resistance and the 4th digit denotes number of zeros following:
≤1% 产品 (E-96系列阻值)
第1~3位表示阻值的有效数，第4位表示有几个0.

Packing Type (包装类型):
B=Bulk/Box (散装 / 盒装)

Packing Qty. (包装数量)
0=Bulk/Box
0= 散装 / 盒装

Additional Information (注):
0=NIL (标准品)

Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明。

Thin Film Technology Feature (薄膜技术特征)

- ✓ 采用薄膜工艺制程获得精准的线路
- ✓ 优化的使用散热陶瓷材料特性
- ✓ 高热可靠性，能承受 300℃ 1min 热板测试
- ✓ 良好的热结合力，可达拉力 1Kg 以上
- ✓ 优异的导通性能，阻抗 ≤0.1E
- ✓ 可按客户要求进行设计
- ✓ 高散热系数材料远优于 PCB 和 LTCC
- ✓ 高热稳定性远优于铝基板
- ✓ 符合 ROHS 要求

- ✓ Thin-film process to obtain accurate of line
- ✓ Optimize the best used of thermal properties of ceramic
- ✓ High reliability , withstand 300 ℃ within 1
- ✓ Good thermal adhesion, tensile reach > 1kg up
- ✓ Excellent conduction performance, impedance under controlled within 0.1E
- ✓ According to customer requirements, OEM available
- ✓ Highly dissipation coefficient than PCB and LTCC
- ✓ Highly heat stability superior than aluminum substrate
- ✓ ROHS compliant for global application

Process Capability 制程能力

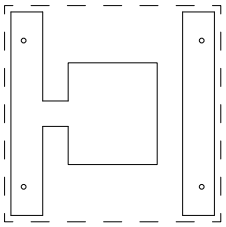
Item 项目	Reference Range 参考范围
Material 材质	AL_2O_3、ALN
Dimension & Thickness 尺寸厚度	Sheet size 4.5"114.3x114.3mm 0.38mm, 0.5mm, 1.0mm
Set-PIN 上机孔	Φ1、1.3、1.5、1.8、2mm Depending on the client machine 取决于客户机台
VIA diameter 导通孔径	75~150μm Depending on the customer requirement 依客户需求
Line spacing 线路间距	The smallest diameter of up to 60μm 最小线径可达 60μm
Plate margins 板边距	Sheet design set aside a minimum of 3mm 基板设计预留最小 3mm
Copper Thickness 镀层厚度	Cu 30~75μm
Surface Coating 表面处理	Electronless Gold/Silver 化学镀 (金 / 银)、Eletrolytic Gold/Silver 电镀 (金 / 银)、OSP Antioxidant treatment 抗氧化处理

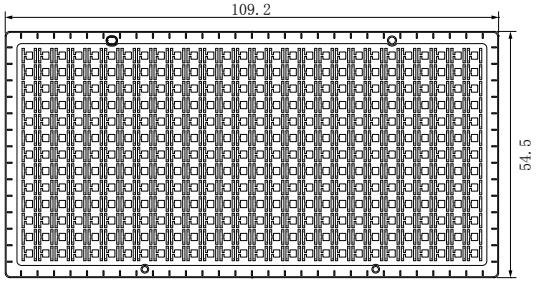
Reliability Test (可靠性测试)

NO	Item 项目	Parameter 测试参数	Specification 测试规范
1	Adhesion test 附着力试验	1. Temp: RT 温度: RT 2. Tool: 3M 600# 工具: 3M 600# 3. Time adhesive 30 seconds 持续粘合 30 秒 4. Angle:180° 角度 : 180°	• The extensor must be no separate 镀层没有被分离
2	Thermal Test 热板试验	1. Temp:300°C 温度 : 300°C 2. Times:1min 时间 :1 分钟	• No yellowing、blisters 未黄变、起泡现象
3	耐热持久性试验 Thermal durability test	1. Temp:150°C 温度 : 150°C 2. Times:3 hours 时间 :3 小时	• test before-and-after 试验前后 • 尺寸形变量 ≤1% • Size shape variables are 1% or less • 导通阻抗恒低于 5mE • Conduction resistance constant below 5 mE

Reference Pattern (Thin-Film) 参考设计图形 (薄膜)

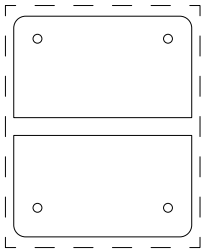
TYPE 1

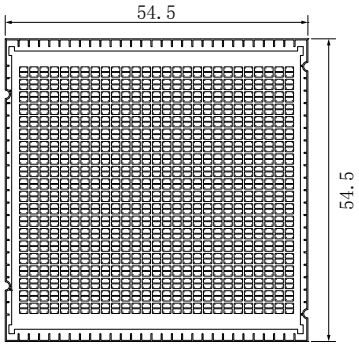




28×13=364 PCS

TYPE 2





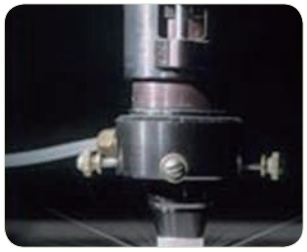
27×20=540 PCS

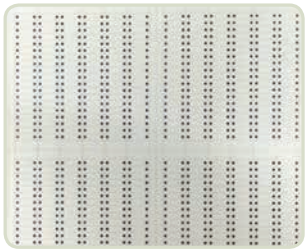
* Product drawing for reference only 产品图片仅供参考
* Custom Design Circuit could be available on a case to case basis. (可按客户特殊要求定制)

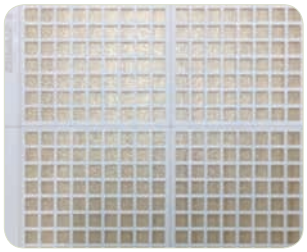
Ceramic Processing Parts (陶瓷加工件)

- ✓ 优异的加工精准度
- ✓ 高绝缘性能及机械性能强度
- ✓ 客制化服务，可按客户要求进行加工
- ✓ 精密研磨，表面粗化处理等
- ✓ 适用于 LED 照明、汽车组件等产品加工

- ✓ Superior processing of accuracy
- ✓ High performance of insulation and mechanical properties
- ✓ Customized design services, OEM available
- ✓ Precision grinding, coarsening treatment of surface
- ✓ It's suitable for LED lighting, automotive components and other products processing







Storage conditions (储存条件)

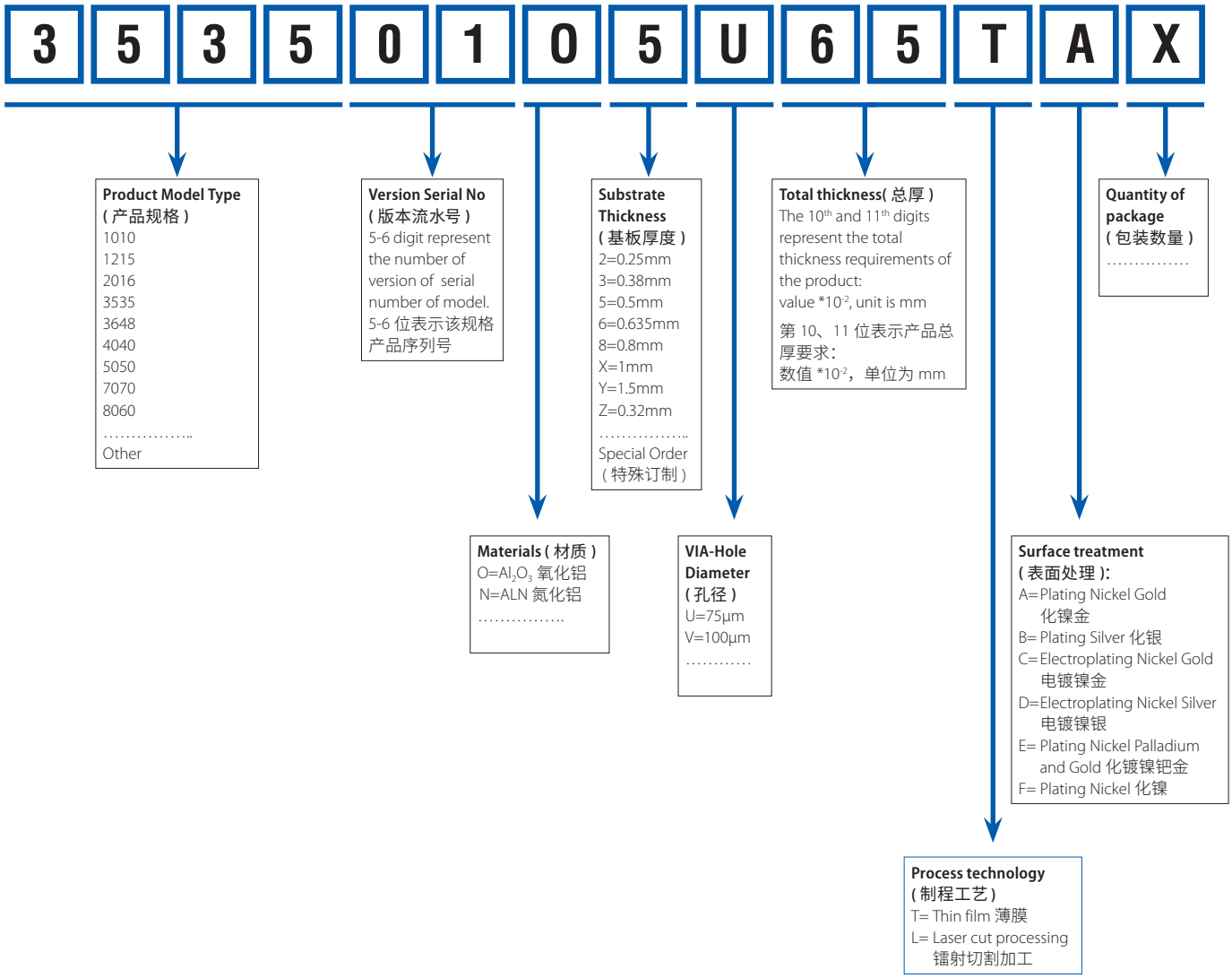
- ✓ Store under 25±5℃,50±10% RH when sealed (密封保存)
- ✓ The expiration date is less than 3 months when unsealed (不开封产品保质期在 3 个月以内)
- ✓ Store under 25±5℃,50±10%RH when unsealed (开封产品的储存条件)
- ✓ Please store unsealed package in airtight containers and try to used within 3 days (已开封产品请于 3 日内使用完，并在一个密闭容器内开封)

Ordering Procedure

订购方式

Example: Open version of 3535 model type , Alumina sheet size 4.5" (114.3x114.3x0.5mm), via hole 75μm, total thickness 0.65mm, Gold (Au) thickness ≥0.03μm

例如：公版 1 3535 规格 氧化铝基板尺寸 4.5 寸 (114.3x114.3x0.5mm), 孔径要求 75μm 总厚要求 0.65mm 金 ≥0.03μm



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Resistors 电阻成品	Material 电子材料	Heat Dissipation Substrate 散热基板

ROYALOHM　uniohm U Need it!　FOSS　aeon

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