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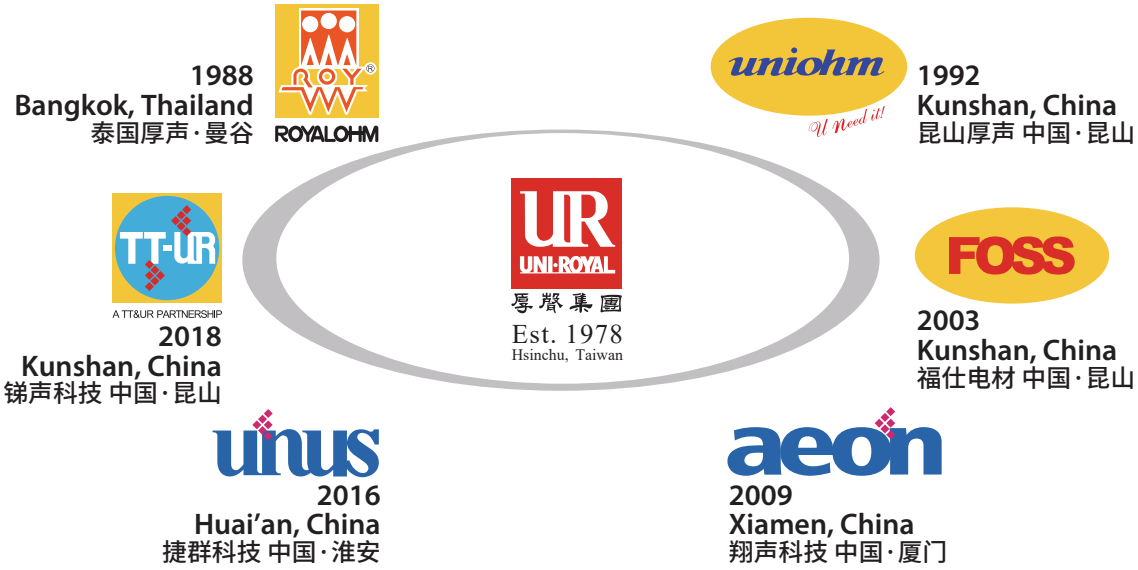
UNI-ROYAL

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

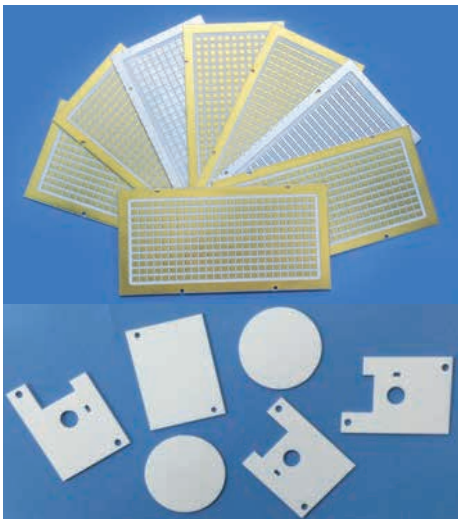
电阻器是电子线路中控制电流及电压的最基本元件 , 被广泛应用于电子电路及电子产品中 , 厚声集团的产品包括薄膜、厚膜晶片电阻，插件电阻如 DIP 排列电阻、碳膜、金属膜、金属氧化膜、玻璃釉、绕线电阻、水泥电阻、功率型电阻以及各种特殊要求的客制化产品。

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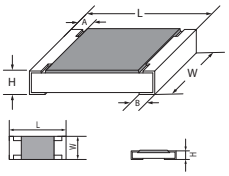
注 : 目录 / 网站參數表仅供一般参考。具体以我司提供的产品规格书为准 , 可根据要求提供所需产品。

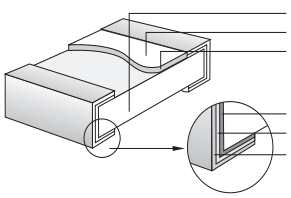
Note: Catalog/website specifications are for general reference only. Detailed Product Specification shall take precedence & is available upon request.

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

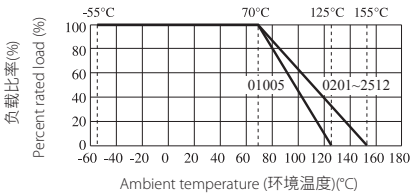
Figures (型状)





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

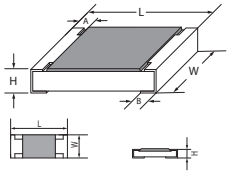
Special Feature (特征):
E = Lead Free (standard)
(无铅标准品)

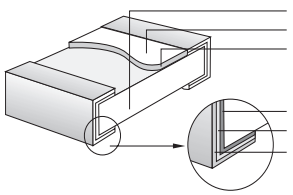
Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明 。

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)





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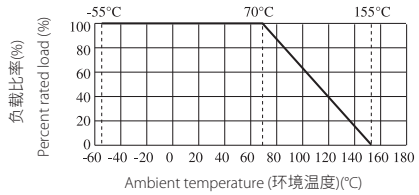
Derating Curve & Specification (降功率曲线及性能)



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

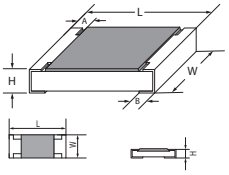
High-Power Thick Film Chip Resistors - HP

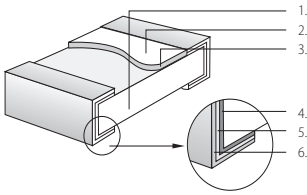
高功率厚膜晶片电阻器 - HP系列

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)





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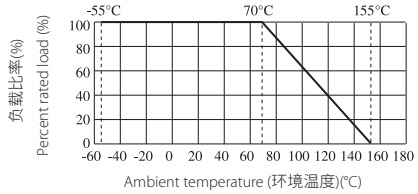
3. Resistance element (阻抗元素)
4. Termination (Inner) Ni / Cr [端面(内)镍/铬层]
5. Termination (Between) Ni Barrier [端面(中)镍层]
6. Termination (Outer) Sn [端面(外)锡层(无铅)]

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		

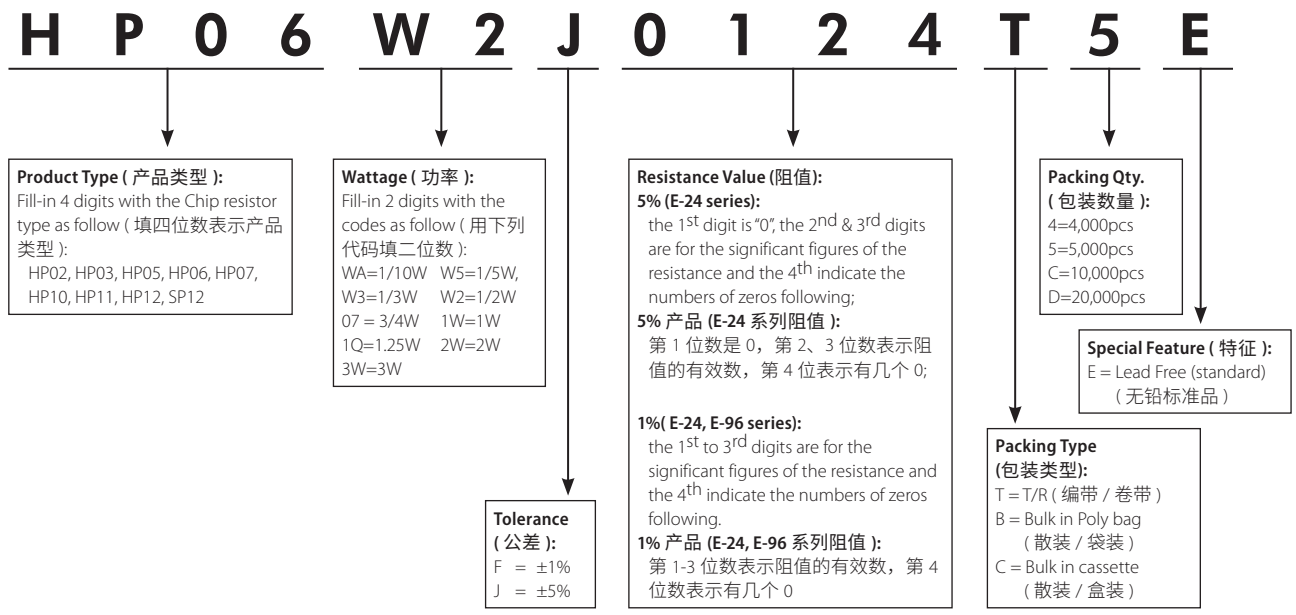
Performance Specifications (性能)

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 。

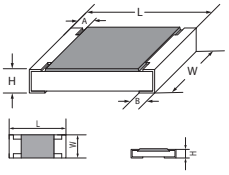
Ultra High Power Thick Film Chip Resistors - SP

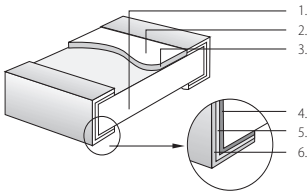
超高功率厚膜晶片电阻器 - SP系列

Feature (特性)

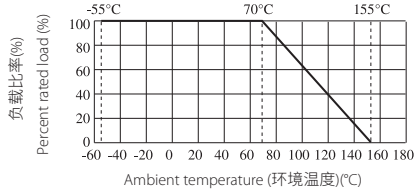
- High power rating up to 6 watts
  高功率可达6W
- Suitable for both wave & re-flow soldering
  适合波峰焊与回流焊
- Application LED lamps, Intelligent home appliances, Medical equipment, Kinds of industrial control devices & Industrial supplies
  适用于LED 灯具、智能家电产品、医疗设备、各种工业控制装置及工业电源等

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 。

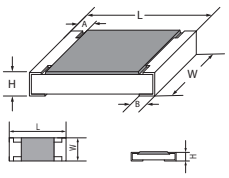
High-Voltage Thick Film Chip Resistors - HV

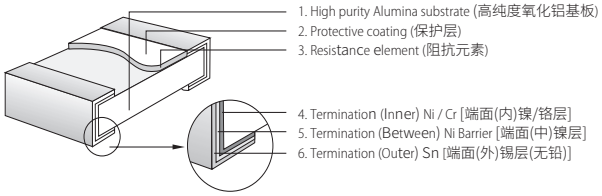
高压厚膜晶片电阻器 - HV系列

Feature (特性)

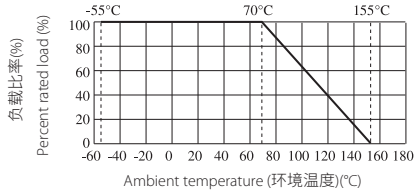
- Superiority in Max. Working Voltage performance than general thick film Chip Resistors. 在最大工作电压上优于普通厚膜晶片电阻
- Suitable for both wave & re-flow soldering 适合波峰焊及回流焊
- Application: AV adapter, LCD Backlight, Flash Light of camera 适用于AV适配器、LCD背光电路、照相机的闪光灯等

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

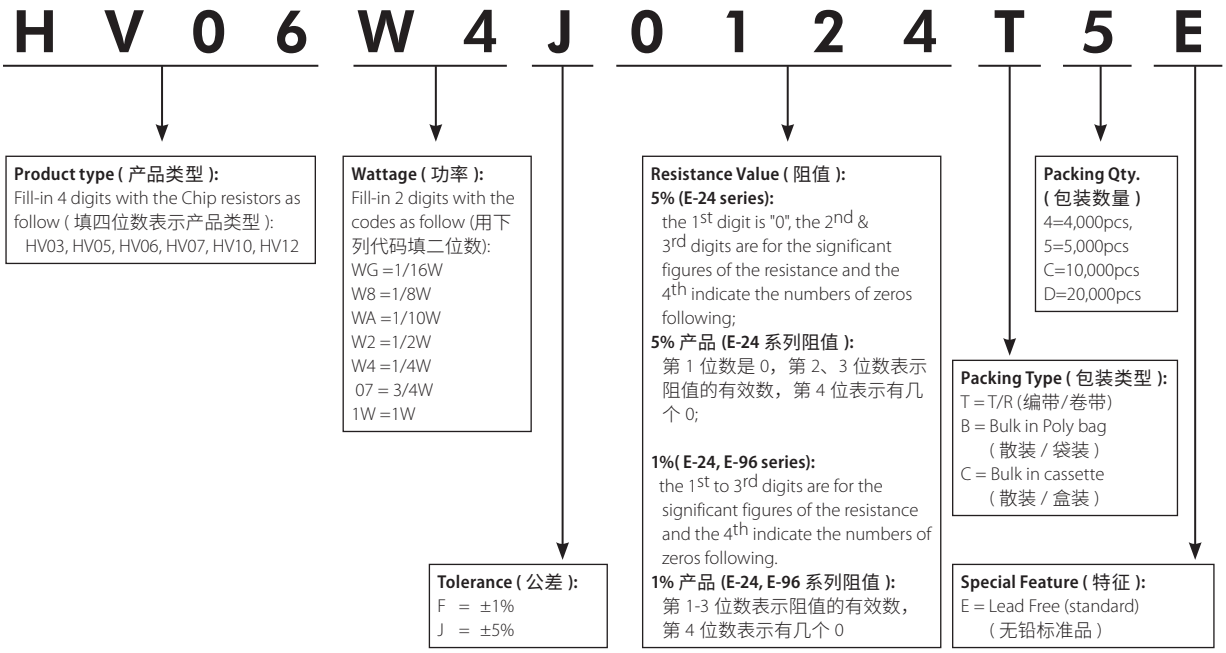
The NV series of Anti-sulfuration products are available in particular. NV系列抗硫化產品可特別提供.

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 。

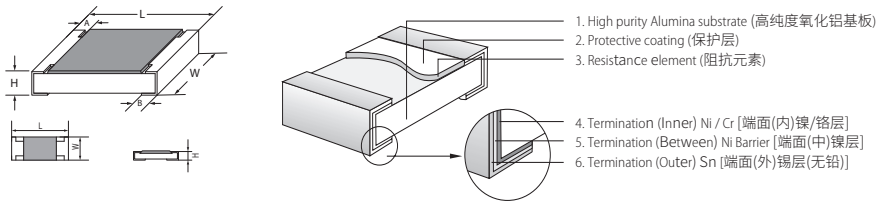
Anti-Surge Thick Film Chip Resistors - AS

抗浪涌厚膜晶片电阻器 - AS系列

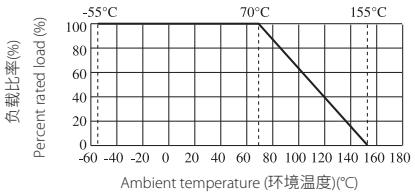
Feature (特性)

- 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

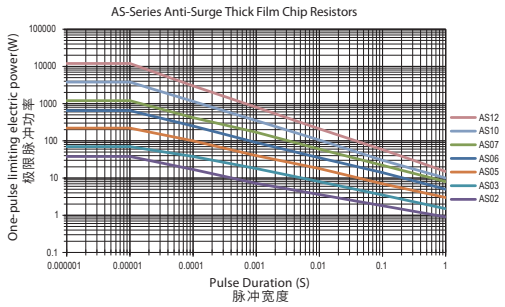
Figures (型状)



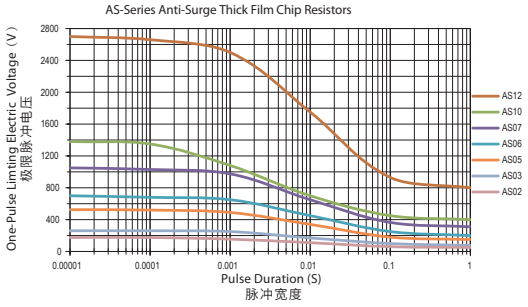
Derating Curve (降功率曲线)



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		

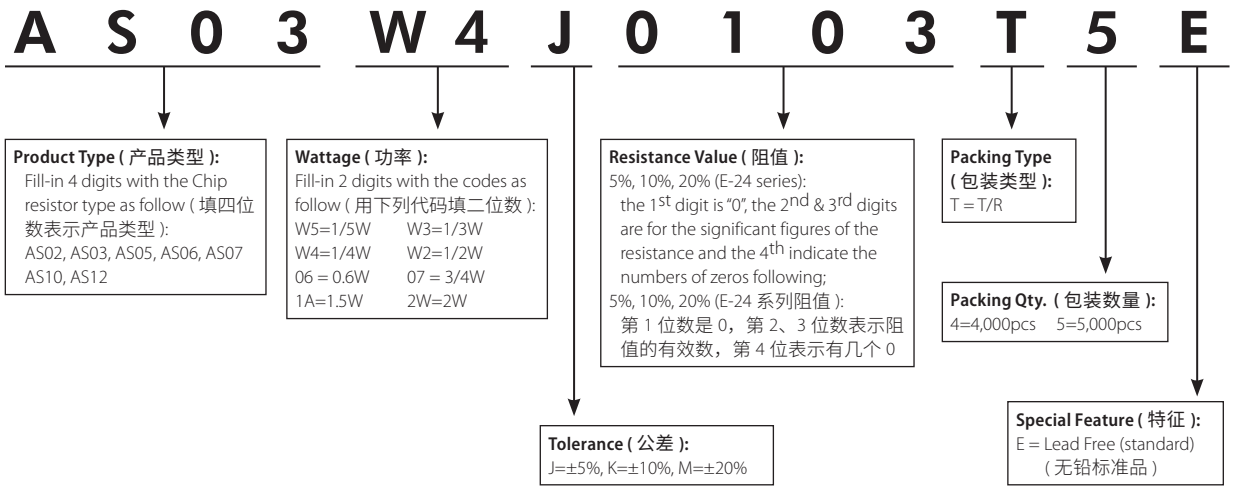
*Special offered 特别提供 : AS12 B:1.80±0.25mm

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

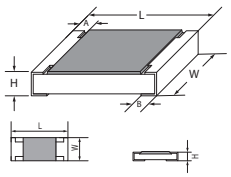
高精度抗浪涌厚膜晶片电阻器 - PS系列

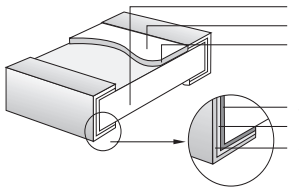
ROYALOHM
www.royalohm.com

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

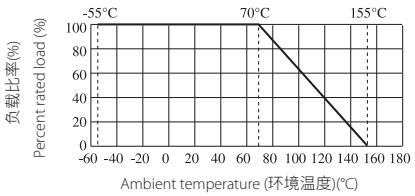
Figures (型状)



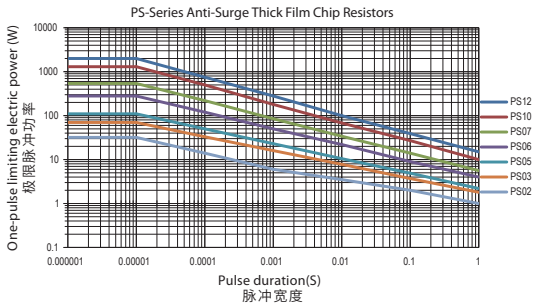


1. High purity Alumina substrate (高纯度氧化铝基板)
2. Protective coating (保护层)
3. Resistance element (阻抗元素)
4. Termination (Inner) Ni / Cr [端面(内)镍/铬层]
5. Termination (Between) Ni Barrier [端面(中)镍层]
6. Termination (Outer) Sn [端面(外)锡层(无铅)]

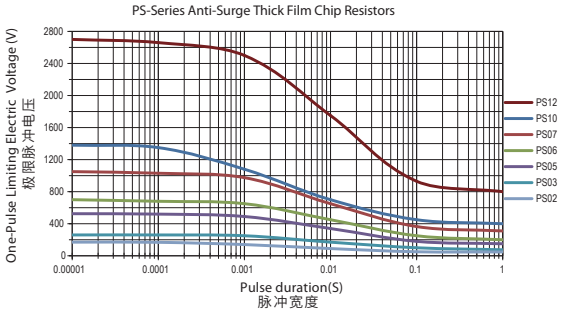
Derating Curve (降功率曲线)



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)

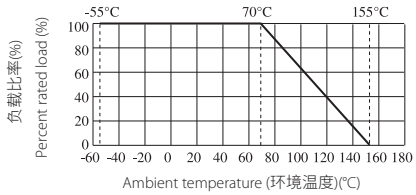
Packing Type (包装类型):
T = T/R (编带 / 卷带)

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

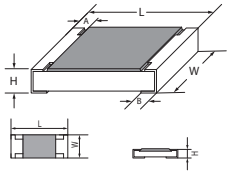
Feature (特性)

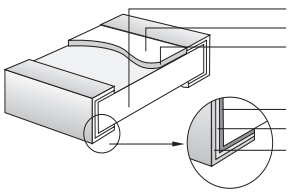
- Low T.C.R ±50PPM/℃ 低T.C.R ±50PPM/℃
- Suitable for reflow & wave soldering 适合波峰焊与回流焊
- Application Precision medical equipment, Auto industrial control system, Communication equipment, IPAD, Portable computer, LED lamps, Intelligent home appliances
  适用于精密医疗器械、自动工业控制系统、通讯设备、IPAD、手提电脑、LED灯具、智能家电产品等

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	

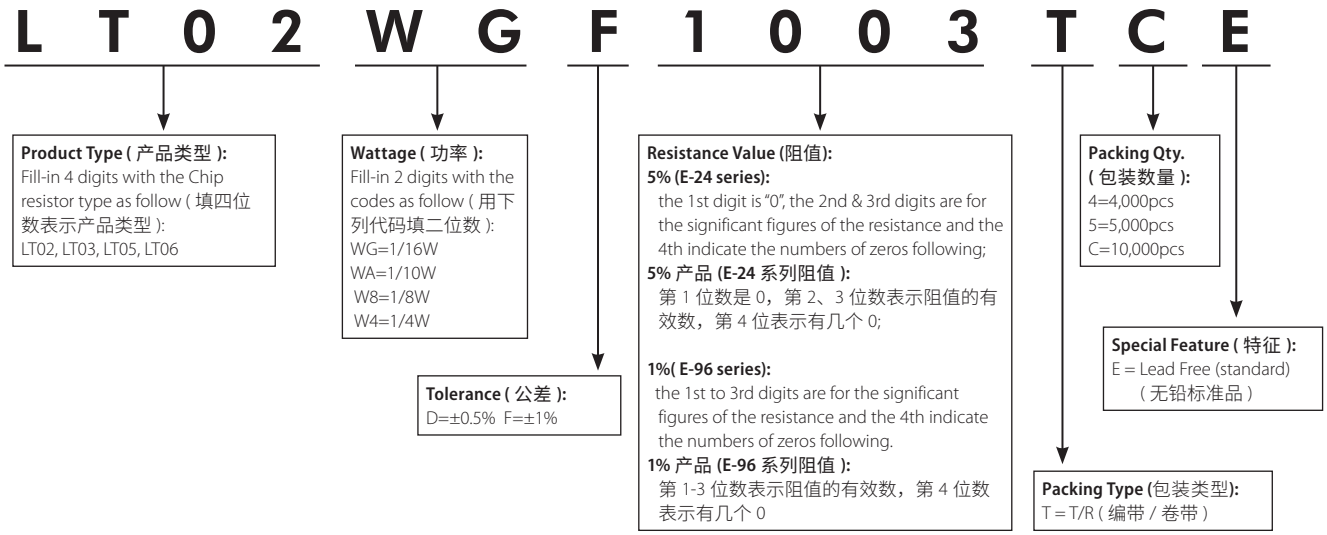
Type 类型	Power 功率 (70°C)	L (mm)	W (mm)	H (mm)	A(mm)	B (mm)	Resistance Range 阻值范围 0.25%, 0.5%, 1%
LT02	1/16W	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10	100Ω~1MΩ
LT03	1/10W	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	1Ω~1MΩ
LT05	1/8W	2.00±0.15	$1.25^{+0.15}_{-0.10}$	0.55±0.10	0.40±0.20	0.40±0.20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

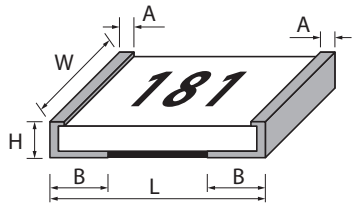
Flex LED Strip use Thick Film Chip Resistor - LE

软灯条专用芯片电阻器 - LE系列

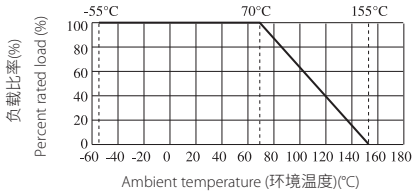
Feature (特性)

- 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					

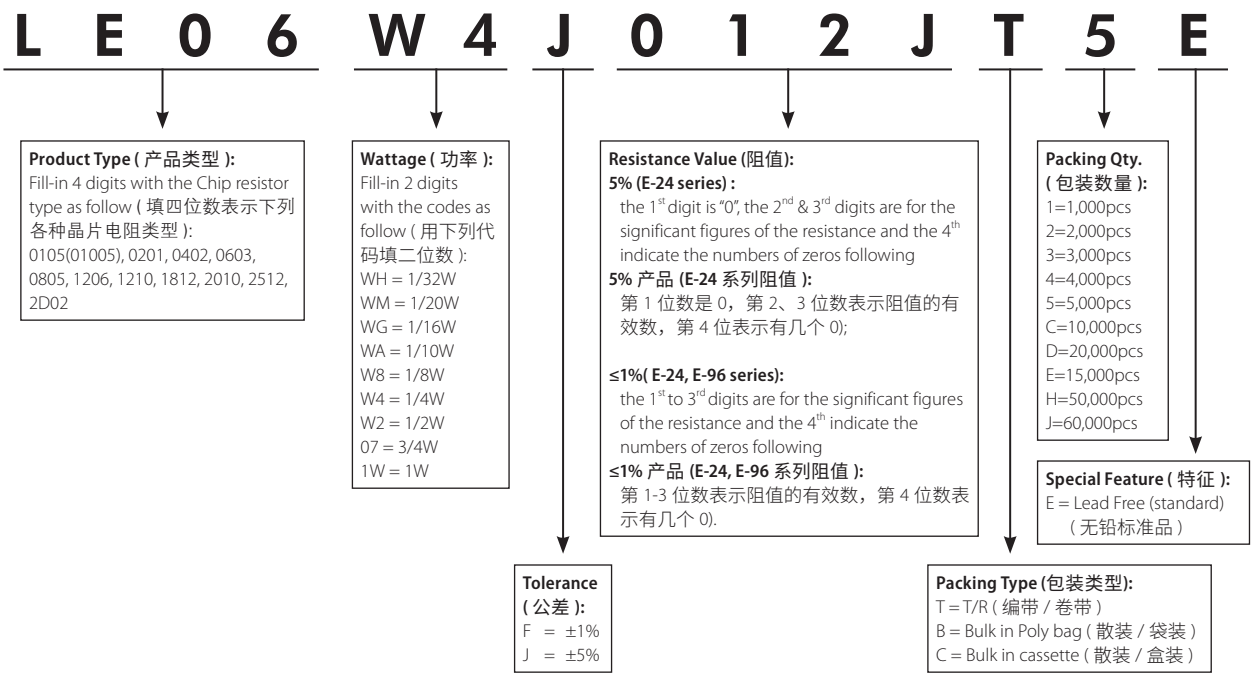
Type 类型	Size 尺寸	Power (功率) (70°C)	L (mm)	W (mm)	H (mm)	A (mm)	B (mm)	Resistance Range (阻值范围)
LE05	0805	1/8W	2.00±0.15	1.25 +0.15 -0.10	0.55±0.10	≤1.0	0.40±0.20	10Ω~820Ω
LE06	1206	1/4W	3.10±0.15	1.55 +0.15 -0.10	0.55±0.10	≤1.0	0.50±0.20	

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)



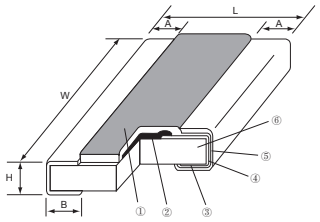
Wide Terminal Thick Film Chip Resistor - WR

宽电极厚膜晶片电阻器 - WR系列

Feature (特性)

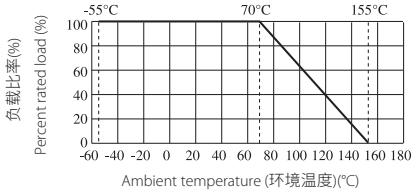
- High power & Wide terminal 高功率，宽电极
- Suitable for both wave & re-flow soldering 适合波峰焊及回流焊
- Application:AV adapters, LCD back-light,camera strobe etc.
  适用于AV适配器，LCD背光电路，照相机阀门等

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。

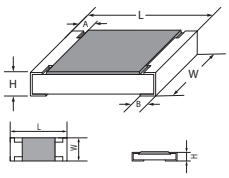
Trimmable Thick Film Chip Resistors - TR

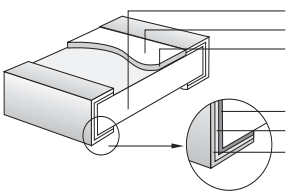
可调厚膜晶片电阻器 - TR系列

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

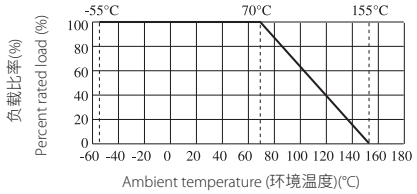
Figures (型状)





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		

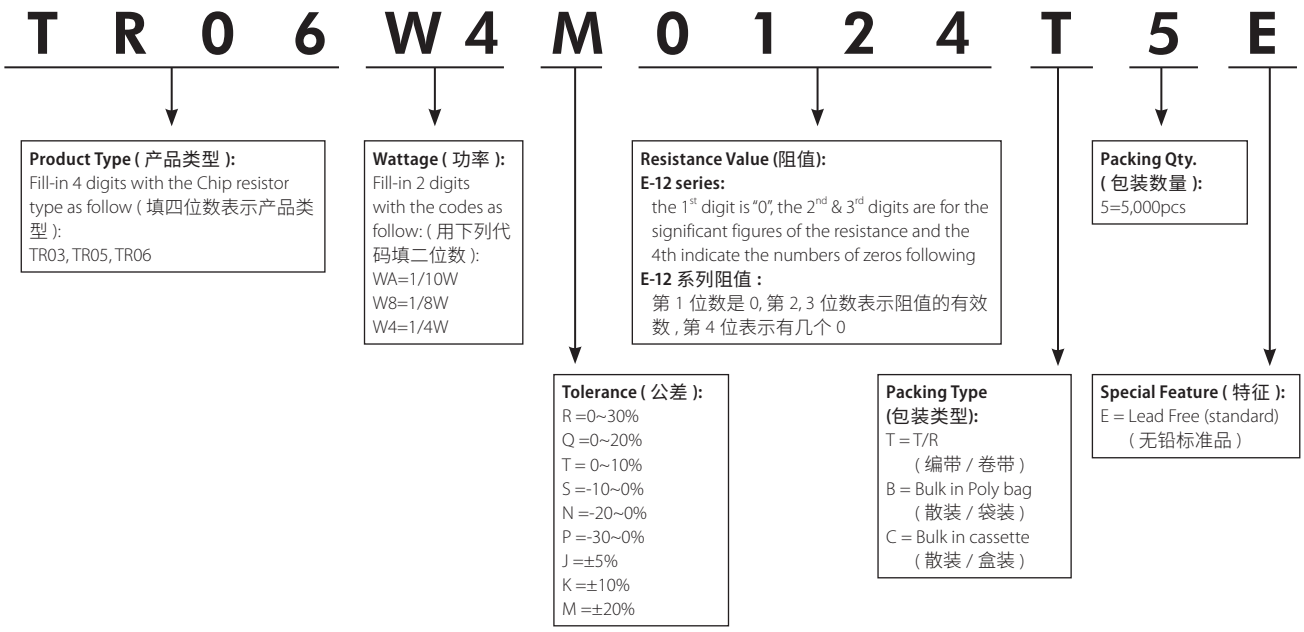
Performance Specification (性能)

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 。

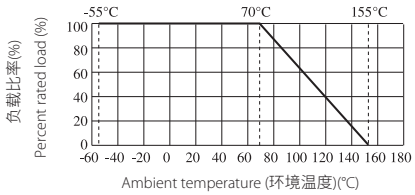
Anti-Electro Static Discharge Thick Film Chip Resistors - ES

ESD 抗静电厚膜电阻器 - ES系列

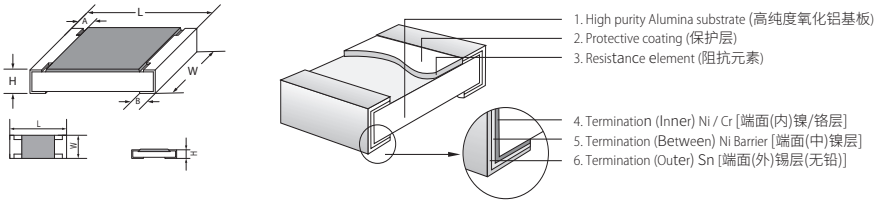
Feature (特性)

- 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)

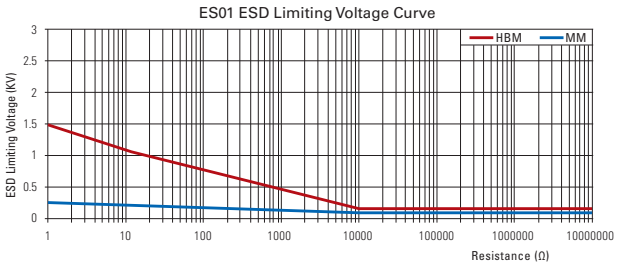
Type 类型	Size 尺寸	Max working voltage 最大工作电压	Max Overload Voltage 最大过负荷电压	Dielectric Withstanding Voltage 绝缘耐压	Operating Temperature 工作温度范围
ES01	0201 (0603)	25V	50V	/	-55~+155℃
ES02	0402 (1005)	50V	100V	100V	
ES03	0603 (1608)	150V	200V	300V	
ES05	0805 (2012)	200V	400V	500V	
ES06	1206 (3216)	500V	1000V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

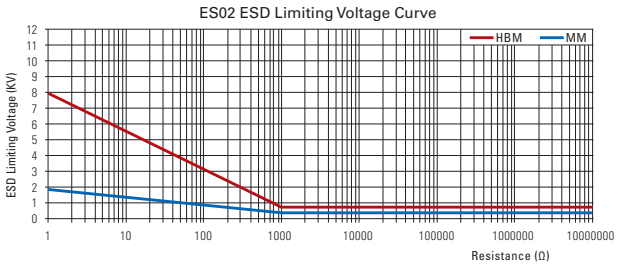
Type 类型	Power 功率 (70°C)	L (mm)	W (mm)	H (mm)	A(mm)	B (mm)	Resistance Range 阻值范围 1% & 5%
ES01	1/20W	0.60±0.03	0.30±0.03	0.23±0.03	0.10±0.05	0.15±0.05	1Ω~10MΩ
ES02	1/16W	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10	
ES03	1/4W	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	
ES05	2/5W	2.00±0.15	$1.25^{+0.15}_{-0.10}$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

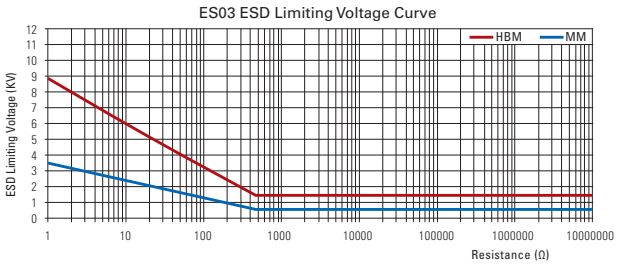
Performance Specifications (性能)

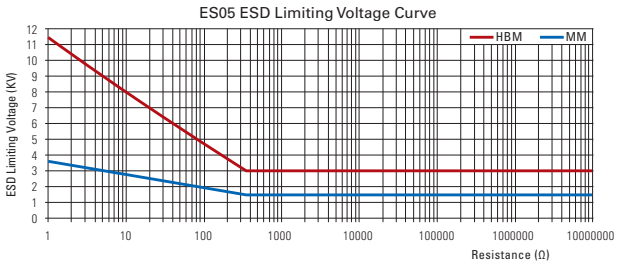
Temperature coefficient	温度系数	ES01: 1Ω≤R≤10Ω: ±400ppm/°C 10Ω<R≤10MΩ: ±200ppm/°C ES02~ES07: 1Ω≤R≤10Ω: ±200ppm/°C 10Ω<R≤10MΩ: ±100ppm/°C
Short-time overload	短时间过负荷	±1%:±(1.0%+0.1Ω) ±5%:±(2.0%+0.1Ω)
Terminal Bending	端子弯曲	±(1.0%+0.05Ω)
Solderability	可焊性	Coverage must be over 95%.
Soldering heat	耐焊接热	±(1.0%+0.05Ω)
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)

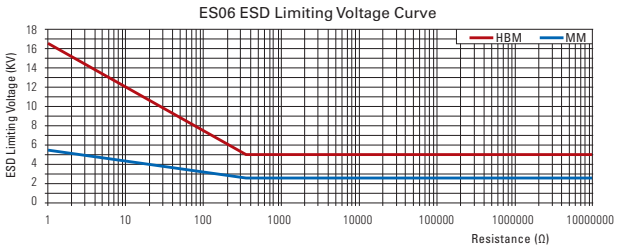
ESD Limiting Voltage Curve (抗静电曲线)

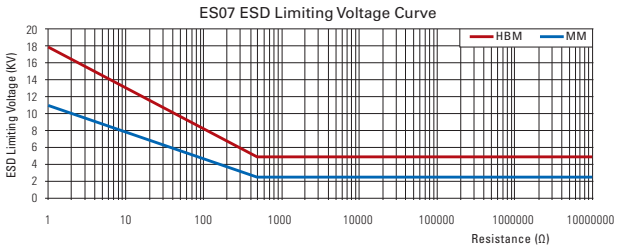












NOTE 备注： HBM:100PF 1K5 1Cycle; MM:200PF 0Ω 1Cycle

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)

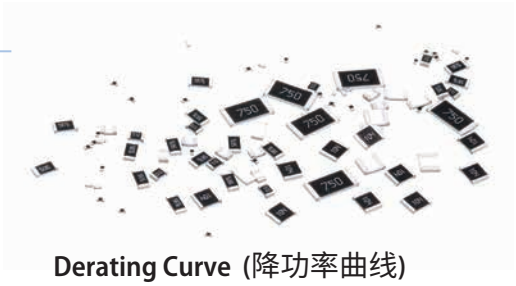
Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明 。

Non-magnetic Thick Film Chip Resistors - NM

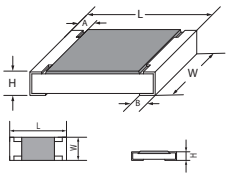
无磁厚膜晶片电阻器 - NM系列

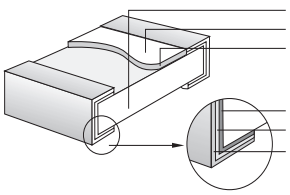
Feature (特性)

- 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



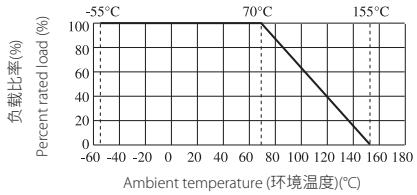
Figures (型状)





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 。

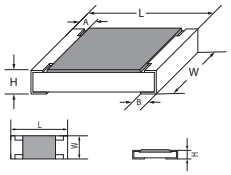
Complete Pb-Free Thick Film Chip Resistor- PF

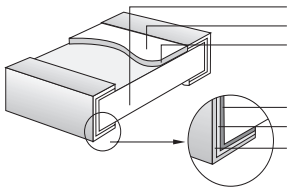
完全无铅厚膜晶片电阻器 - PF系列

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

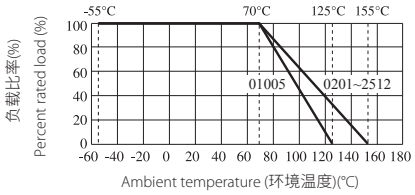
Figures (型状)





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								

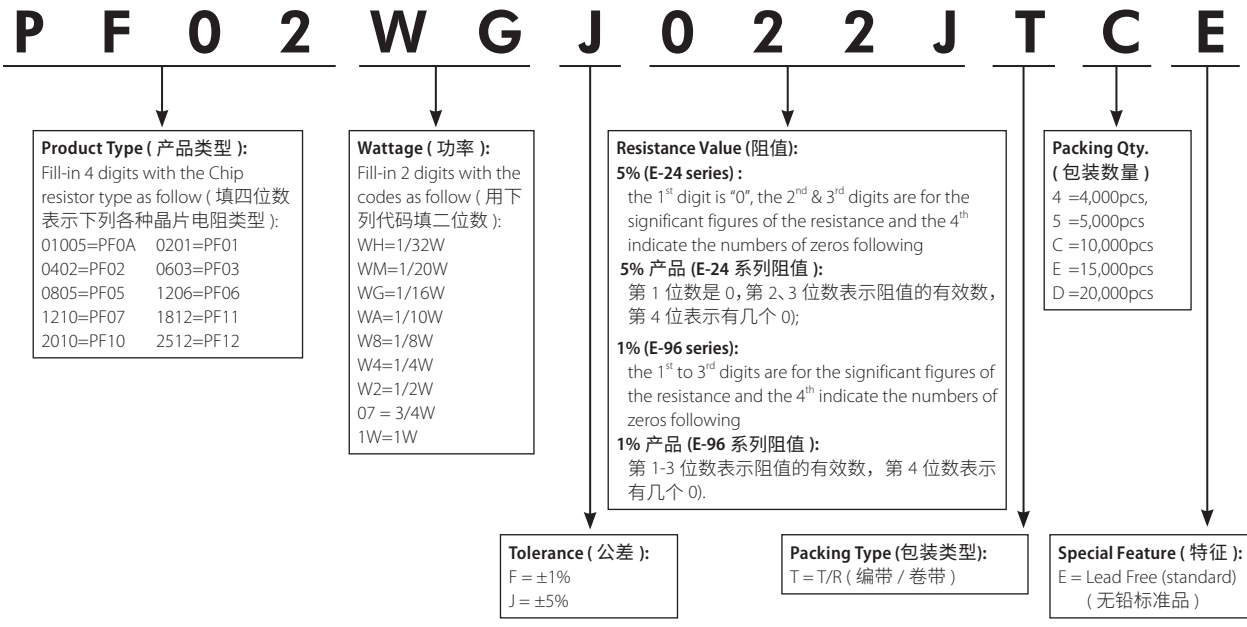
Type 类型		PF0A	PF01	PF02	PF03	PF05	PF06	PF07	PF11	PF10	PF12
Power Rating at 70°C 功率		1/32W	1/20W	1/16W	1/10W	1/8W	1/4W	1/2W	3/4W	3/4W	1W
Dimension 尺寸	L(mm)	0.40±0.02	0.60±0.03	1.00±0.10	1.60±0.10	2.00±0.15	3.10±0.15	3.10±0.10	4.50±0.20	5.00±0.10	6.35±0.10
	W(mm)	0.20±0.02	0.30±0.03	0.50±0.05	0.80±0.10	$1.25^{+0.15}_{-0.10}$	$1.55^{+0.15}_{-0.10}$	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

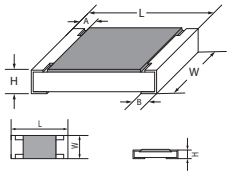
Feature (特性)

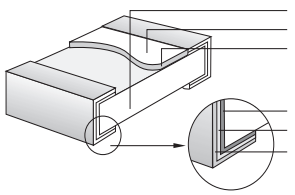
- Thin film NiCr Resistance element
  薄膜镍铬阻抗组件
- Very tight tolerance ±0.05% ~ ±1%
  高精密的公差 ±0.05% ~ ±1%
- Extremely low TCR ±5ppm~±50ppm
  极低的温度系数 ±5ppm~±50ppm
- Completed Lead-free 完全无铅产品

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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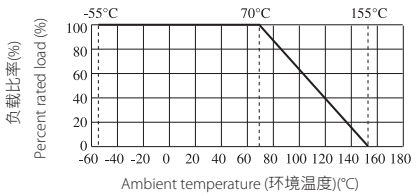

Type 类型	Size 尺寸	L (mm)	W (mm)	H (mm)	A (mm)	B (mm)
TC02	0402 (1005)	1.00±0.10	0.50±0.05	0.35±0.05	0.2±0.1	0.25±0.10
TC03	0603 (1608)	1.60±0.10	0.80±0.10	0.45±0.10	0.3±0.2	0.30±0.20
TC05	0805 (2012)	2.00±0.15	$1.25^{+0.15}_{-0.10}$	0.55±0.10	0.3±0.2	0.40±0.20
TC06	1206 (3216)	3.10±0.15	$1.55^{+0.15}_{-0.10}$	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%