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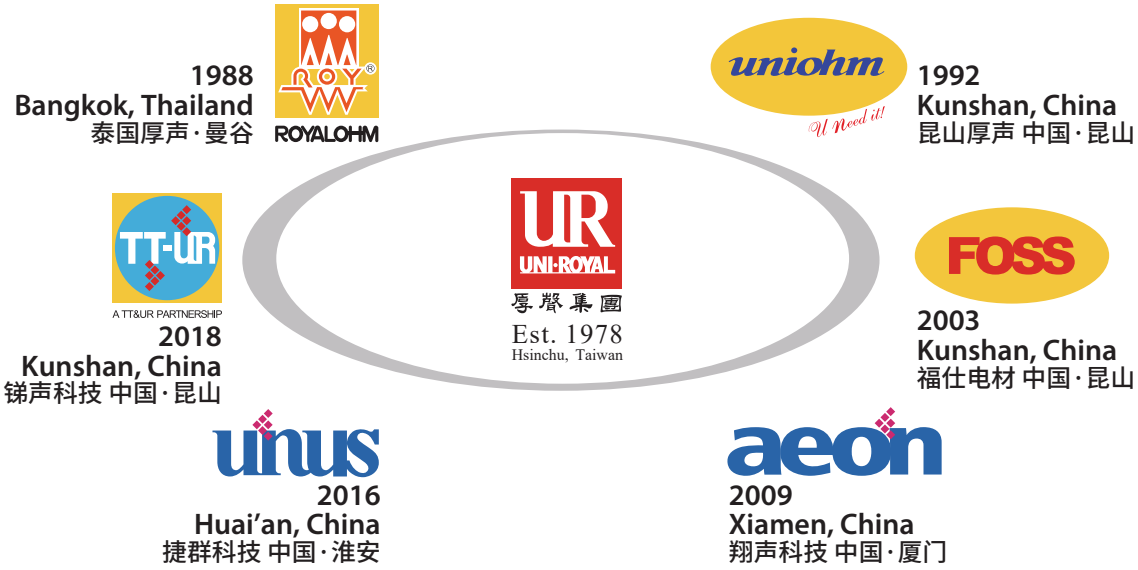
UNI-ROYAL

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

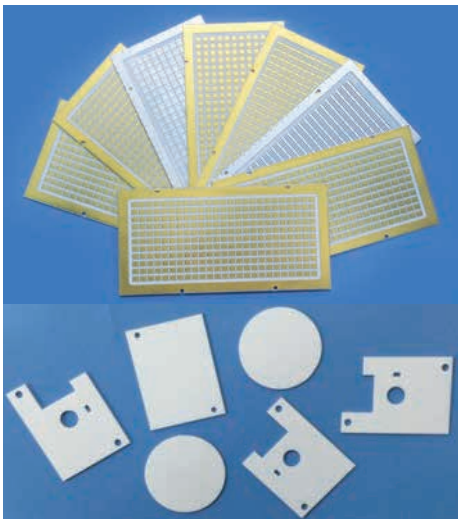
电阻器是电子线路中控制电流及电压的最基本元件 , 被广泛应用于电子电路及电子产品中 , 厚声集团的产品包括薄膜、厚膜晶片电阻，插件电阻如 DIP 排列电阻、碳膜、金属膜、金属氧化膜、玻璃釉、绕线电阻、水泥电阻、功率型电阻以及各种特殊要求的客制化产品。

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.

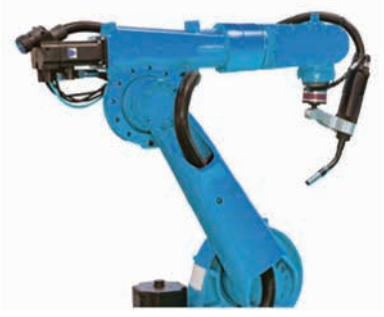
厚声电阻可生产多颗电阻封装于一体的晶片排阻和引线型单列直插式排阻，也可配合客户需求设计制做 RC 或 RL 网络排阻，还可以配合客户设计制做带温度检测功能的过流软保护元件。

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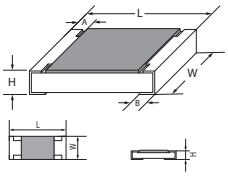
注 : 目录 / 网站参數表仅供一般参考。具体以我司提供的产品规格书为准 , 可根据要求提供所需产品。

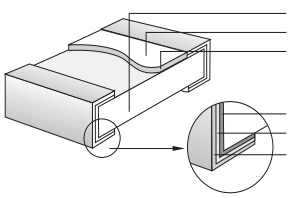
Note: Catalog/website specifications are for general reference only. Detailed Product Specification shall take precedence & is available upon request.

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

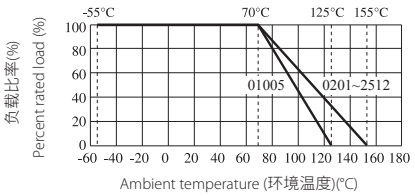
Figures (型状)





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

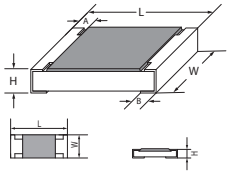
Special Feature (特征):
E = Lead Free (standard)
(无铅标准品)

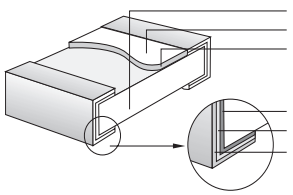
Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明 。

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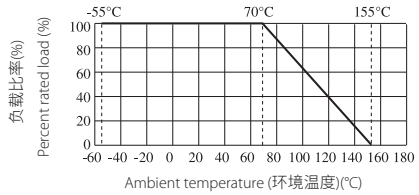
Derating Curve & Specification (降功率曲线及性能)



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

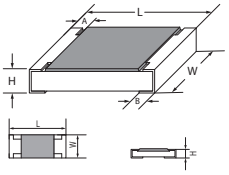
High-Power Thick Film Chip Resistors - HP

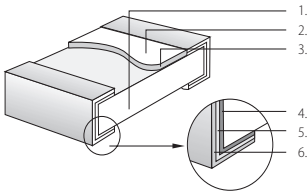
高功率厚膜晶片电阻器 - HP系列

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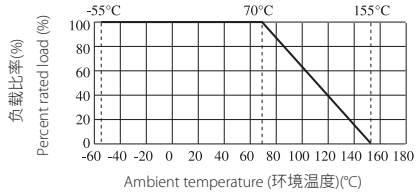
Derating Curve & Specification (降功率曲线及性能)



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)

H P 0 6 W 2 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):
HP02, HP03, HP05, HP06, HP07, HP10, HP11, HP12, SP12

Wattage (功率):
Fill-in 2 digits with the codes as follow (用下列代码填二位数):
WA=1/10W W5=1/5W,
W3=1/3W W2=1/2W
07 = 3/4W 1W=1W
1Q=1.25W 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
C=10,000pcs
D=20,000pcs

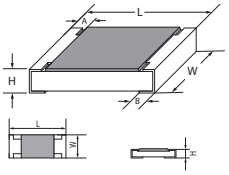
Special Feature (特征):
E = Lead Free (standard)
(无铅标准品)

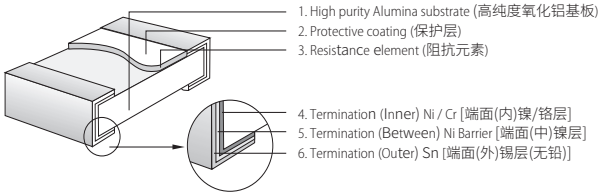
Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明 。

Feature (特性)

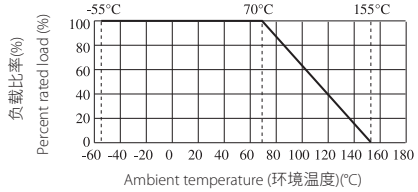
- High power rating up to 6 watts
  高功率可达6W
- Suitable for both wave & re-flow soldering
  适合波峰焊与回流焊
- Application LED lamps, Intelligent home appliances, Medical equipment, Kinds of industrial control devices & Industrial supplies
  适用于LED 灯具、智能家电产品、医疗设备、各种工业控制装置及工业电源等

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

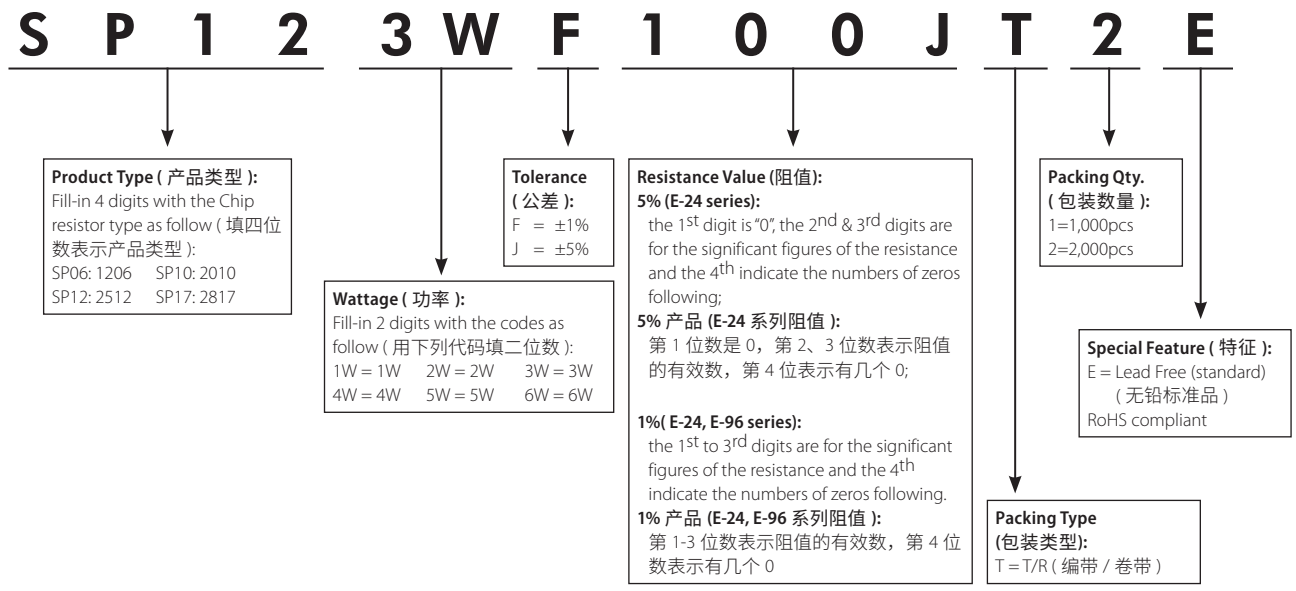
Type 类型	Size 尺寸	Power Rating at 70°C 功率	Resistance Range of 1% & 5% 1% & 5% 的阻值范围	Max. Working Voltage 最大工作电压	Max. Overload Voltage 最大过负荷电压	Dielectric Withstanding Voltage 绝缘耐压	Operating Temperature 工作温度范围
SP10	2010 (5025)	2W	1Ω ~ 10MΩ	200V	500V	500V	-55℃~155℃
SP12	2512 (6432)	3W		250V	500V	500V	
SP17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



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

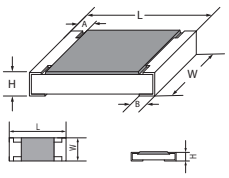
High-Voltage Thick Film Chip Resistors - HV

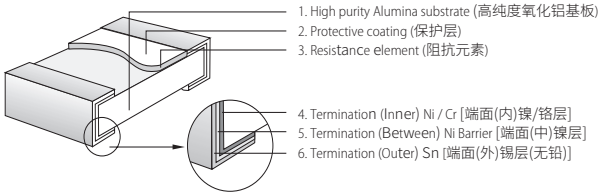
高压厚膜晶片电阻器 - HV系列

Feature (特性)

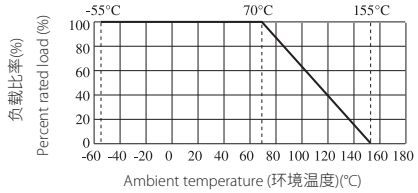
- Superiority in Max. Working Voltage performance than general thick film Chip Resistors. 在最大工作电压上优于普通厚膜晶片电阻
- Suitable for both wave & re-flow soldering 适合波峰焊及回流焊
- Application: AV adapter, LCD Backlight, Flash Light of camera 适用于AV适配器、LCD背光电路、照相机的闪光灯等

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

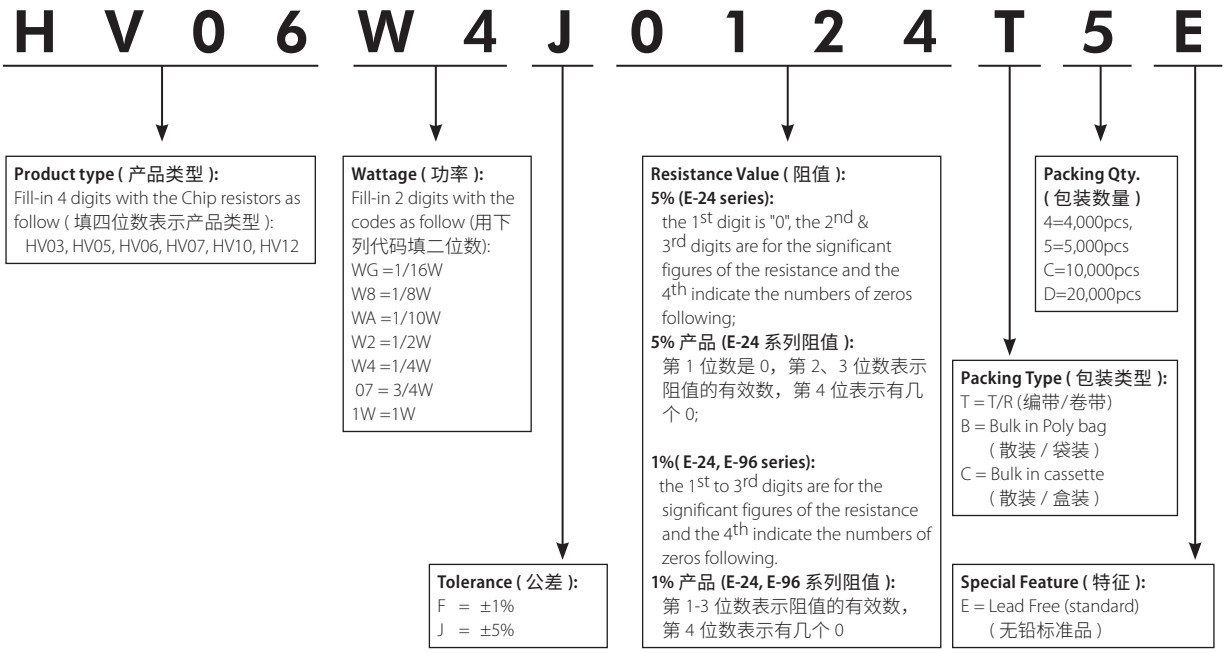
The NV series of Anti-sulfuration products are available in particular. NV系列抗硫化產品可特別提供.

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)

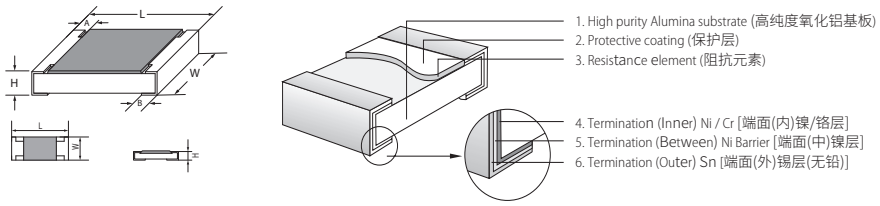


Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明 。

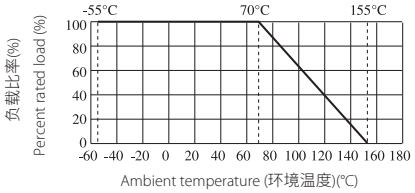
Feature (特性)

- 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

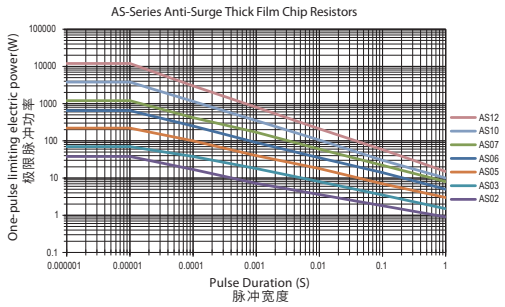
Figures (型状)



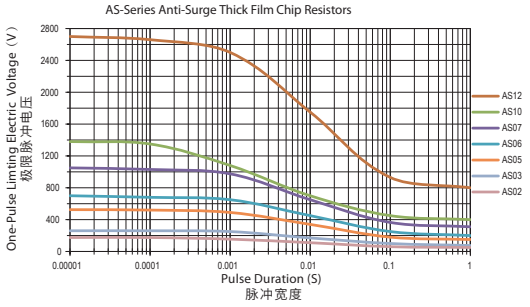
Derating Curve (降功率曲线)



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		

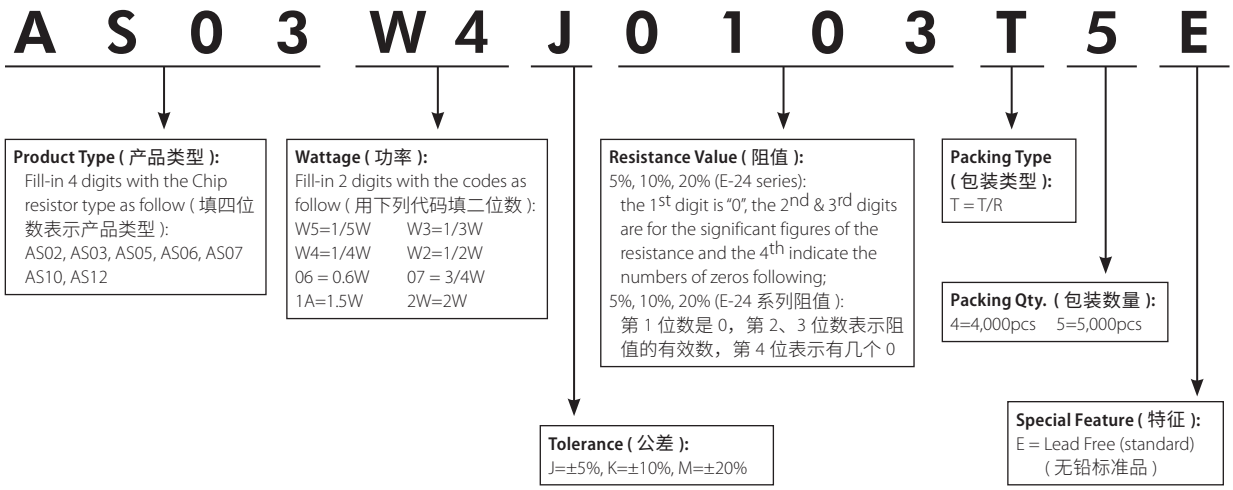
*Special offered 特别提供 : AS12 B:1.80±0.25mm

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。

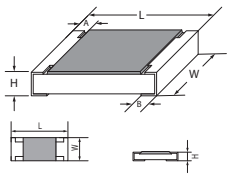
High-Precision Anti-Surge Thick Film Chip Resistors - PS

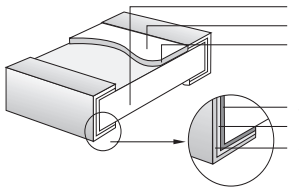
高精度抗浪涌厚膜晶片电阻器 - PS系列

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

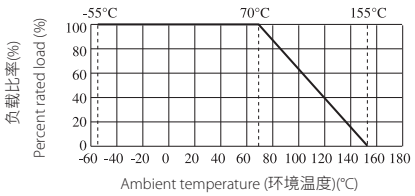
Figures (型状)



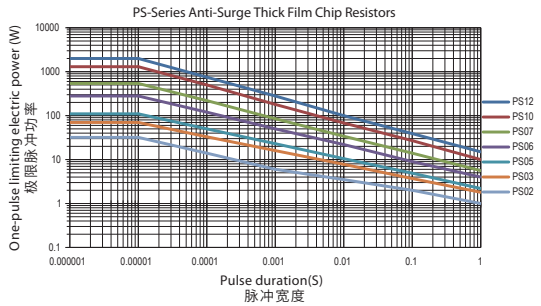


1. High purity Alumina substrate (高纯度氧化铝基板)
2. Protective coating (保护层)
3. Resistance element (阻抗元素)
4. Termination (Inner) Ni / Cr [端面(内)镍/铬层]
5. Termination (Between) Ni Barrier [端面(中)镍层]
6. Termination (Outer) Sn [端面(外)锡层(无铅)]

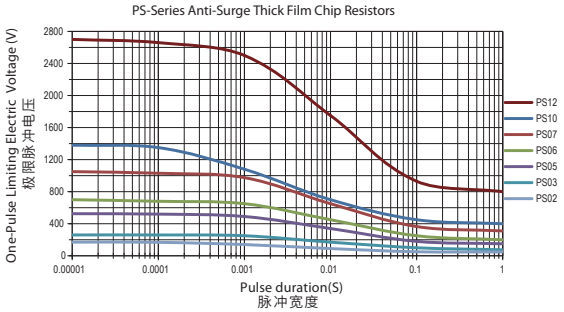
Derating Curve (降功率曲线)



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)

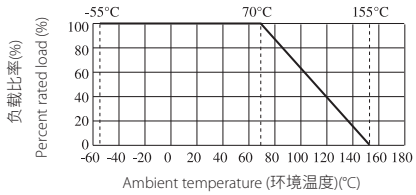
Packing Type (包装类型):
T = T/R (编带 / 卷带)

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

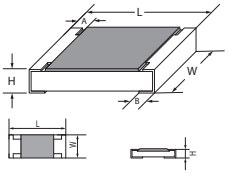
Feature (特性)

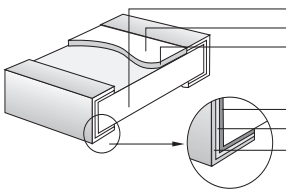
- Low T.C.R ±50PPM/℃ 低T.C.R ±50PPM/℃
- Suitable for reflow & wave soldering 适合波峰焊与回流焊
- Application Precision medical equipment, Auto industrial control system, Communication equipment, IPAD, Portable computer, LED lamps, Intelligent home appliances
  适用于精密医疗器械、自动工业控制系统、通讯设备、IPAD、手提电脑、LED灯具、智能家电产品等

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	

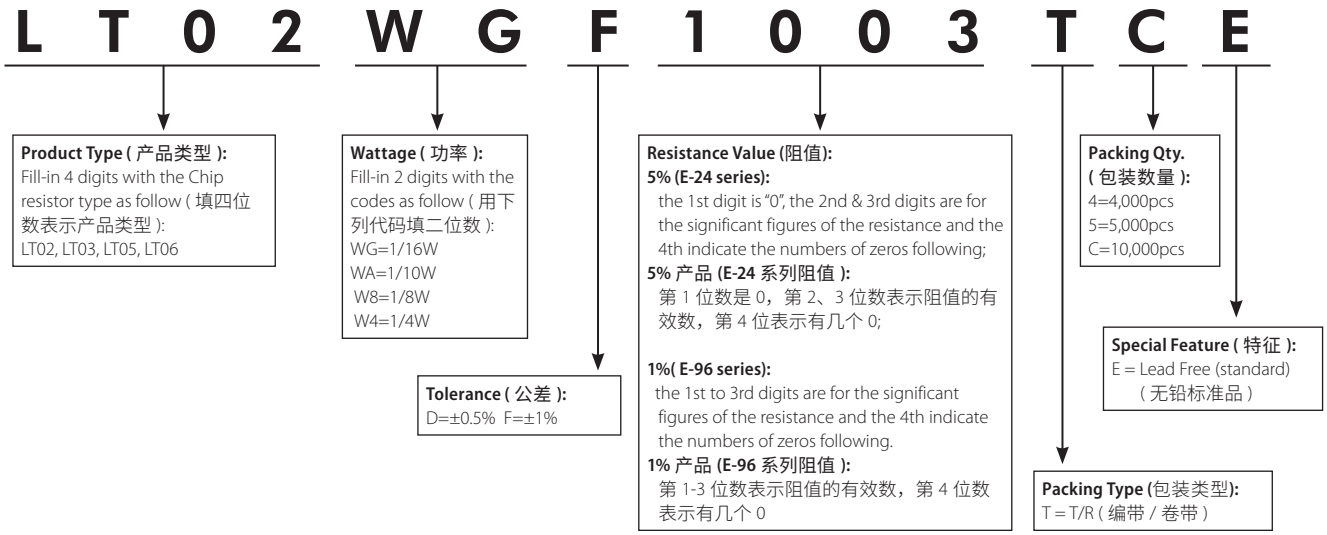
Type 类型	Power 功率 (70°C)	L (mm)	W (mm)	H (mm)	A(mm)	B (mm)	Resistance Range 阻值范围 0.25%, 0.5%, 1%
LT02	1/16W	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10	100Ω~1MΩ
LT03	1/10W	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	1Ω~1MΩ
LT05	1/8W	2.00±0.15	1.25 $^{+0.15}_{-0.10}$	0.55±0.10	0.40±0.20	0.40±0.20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

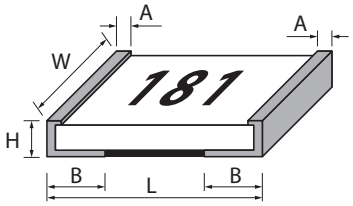
Flex LED Strip use Thick Film Chip Resistor - LE

软灯条专用芯片电阻器 - LE系列

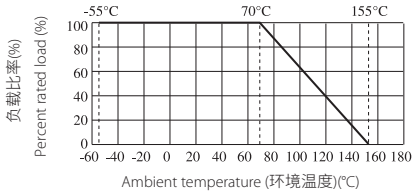
Feature (特性)

- 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					

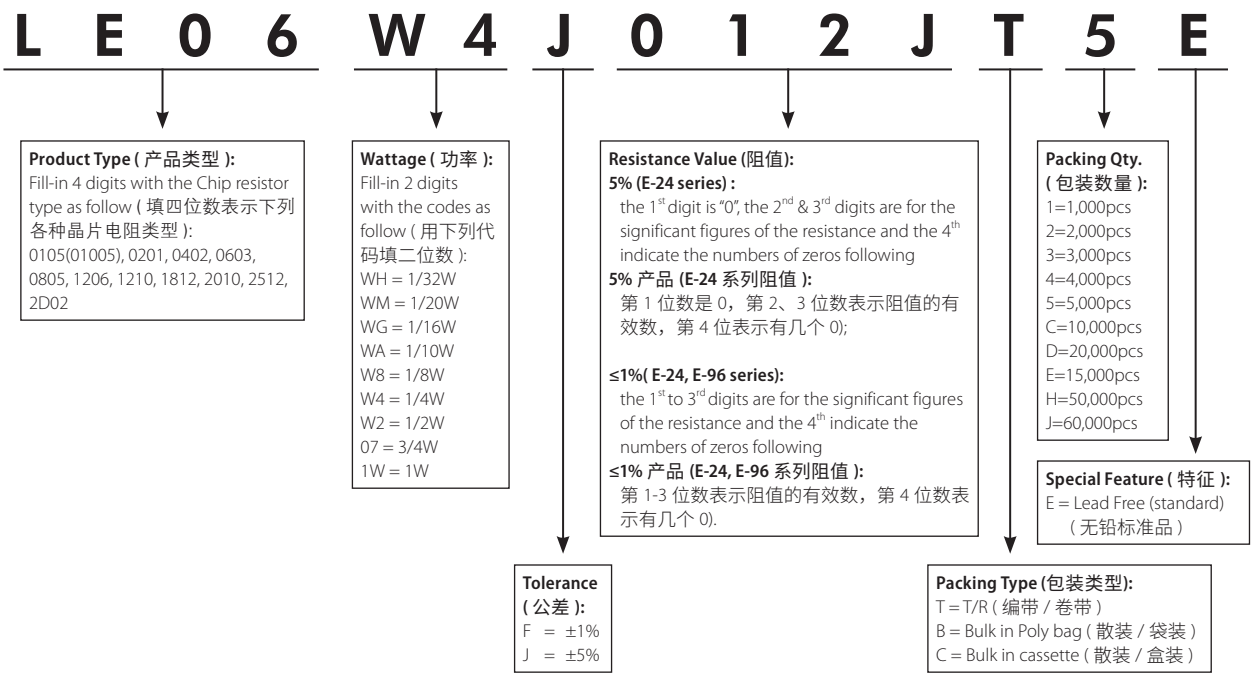
Type 类型	Size 尺寸	Power (功率) (70°C)	L (mm)	W (mm)	H (mm)	A (mm)	B (mm)	Resistance Range (阻值范围)
LE05	0805	1/8W	2.00±0.15	1.25 +0.15 -0.10	0.55±0.10	≤1.0	0.40±0.20	10Ω~820Ω
LE06	1206	1/4W	3.10±0.15	1.55 +0.15 -0.10	0.55±0.10	≤1.0	0.50±0.20	

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)



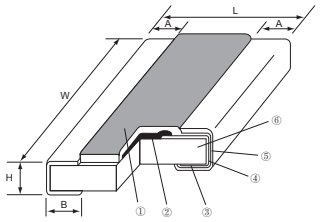
Wide Terminal Thick Film Chip Resistor - WR

宽电极厚膜晶片电阻器 - WR系列

Feature (特性)

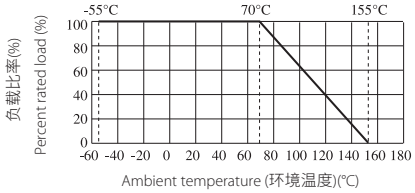
- High power & Wide terminal 高功率，宽电极
- Suitable for both wave & re-flow soldering 适合波峰焊及回流焊
- Application:AV adapters, LCD back-light,camera strobe etc.
  适用于AV适配器，LCD背光电路，照相机阀门等

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。

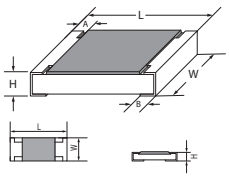
Trimmable Thick Film Chip Resistors - TR

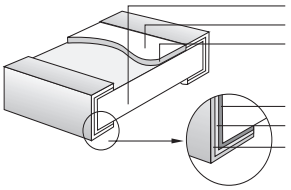
可调厚膜晶片电阻器 - TR系列

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

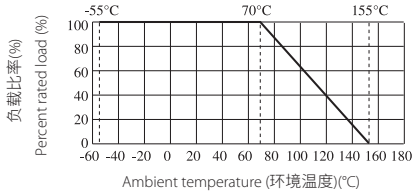
Figures (型状)





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		

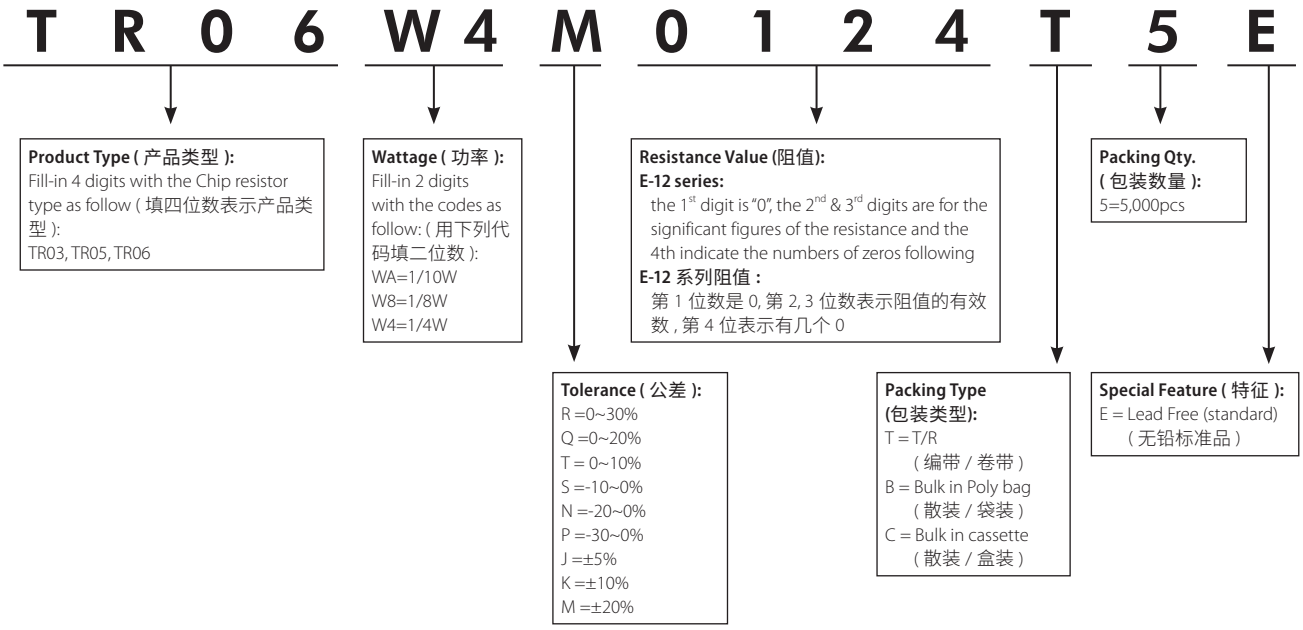
Performance Specification (性能)

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 。

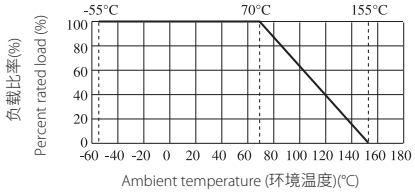
Anti-Electro Static Discharge Thick Film Chip Resistors - ES

ESD 抗静电厚膜电阻器 - ES系列

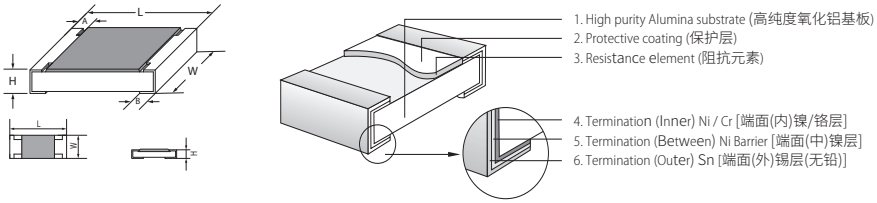
Feature (特性)

- 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)

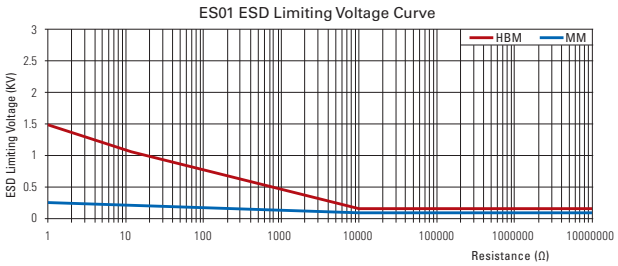
Type 类型	Size 尺寸	Max working voltage 最大工作电压	Max Overload Voltage 最大过负荷电压	Dielectric Withstanding Voltage 绝缘耐压	Operating Temperature 工作温度范围
ES01	0201 (0603)	25V	50V	/	-55~+155℃
ES02	0402 (1005)	50V	100V	100V	
ES03	0603 (1608)	150V	200V	300V	
ES05	0805 (2012)	200V	400V	500V	
ES06	1206 (3216)	500V	1000V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

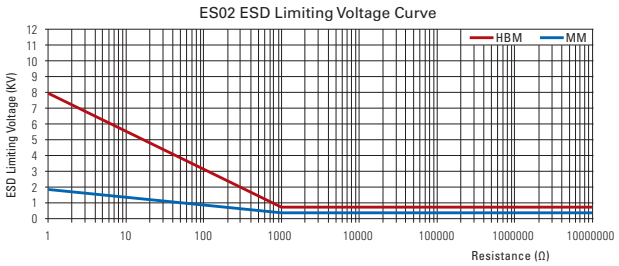
Type 类型	Power 功率 (70°C)	L (mm)	W (mm)	H (mm)	A(mm)	B (mm)	Resistance Range 阻值范围 1% & 5%
ES01	1/20W	0.60±0.03	0.30±0.03	0.23±0.03	0.10±0.05	0.15±0.05	1Ω~10MΩ
ES02	1/16W	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10	
ES03	1/4W	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	
ES05	2/5W	2.00±0.15	$1.25^{+0.15}_{-0.10}$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

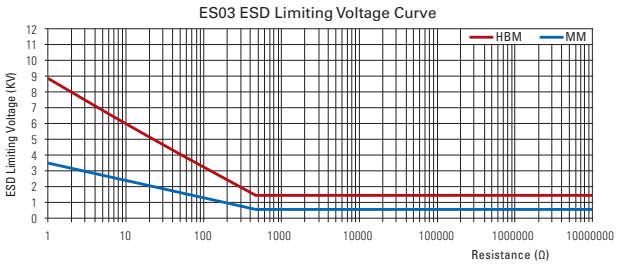
Performance Specifications (性能)

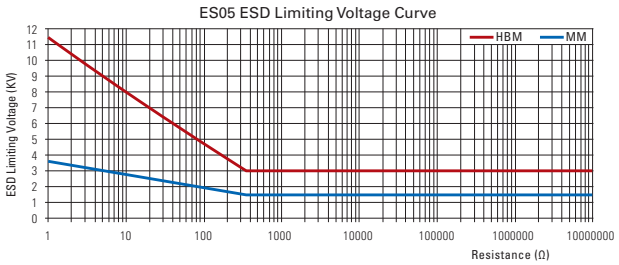
Temperature coefficient	温度系数	ES01: 1Ω≤R≤10Ω: ±400ppm/°C 10Ω<R≤10MΩ: ±200ppm/°C ES02~ES07: 1Ω≤R≤10Ω: ±200ppm/°C 10Ω<R≤10MΩ: ±100ppm/°C
Short-time overload	短时间过负荷	±1%:±(1.0%+0.1Ω) ±5%:±(2.0%+0.1Ω)
Terminal Bending	端子弯曲	±(1.0%+0.05Ω)
Solderability	可焊性	Coverage must be over 95%.
Soldering heat	耐焊接热	±(1.0%+0.05Ω)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

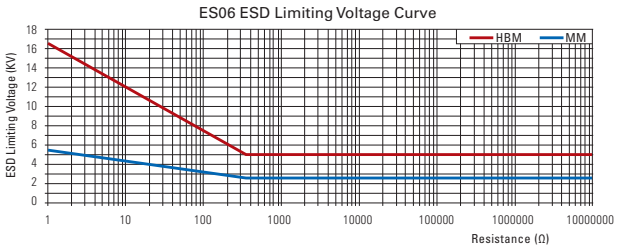
ESD Limiting Voltage Curve (抗静电曲线)

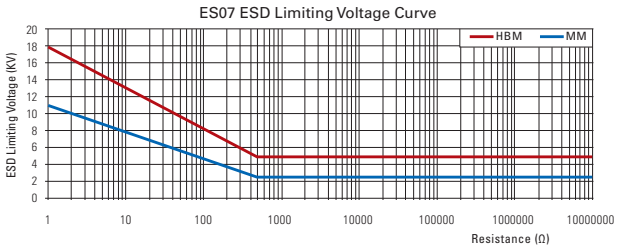












NOTE 备注： HBM:100PF 1K5 1Cycle; MM:200PF 0Ω 1Cycle

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 Type (包装类型):
T = T/R (编带 / 卷带)

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)

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

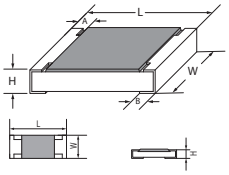
Non-magnetic Thick Film Chip Resistors - NM

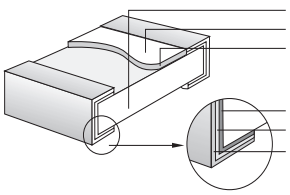
无磁厚膜晶片电阻器 - NM系列

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

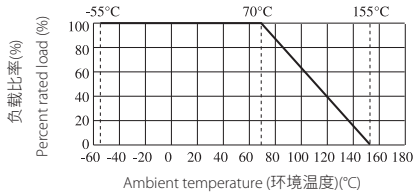
Figures (型状)





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 。

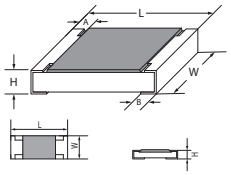
Complete Pb-Free Thick Film Chip Resistor- PF

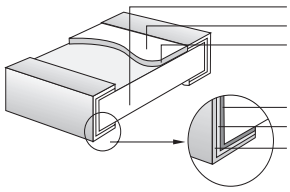
完全无铅厚膜晶片电阻器 - PF系列

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

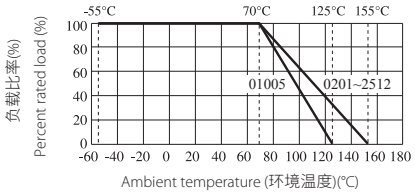
Figures (型状)





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/°C 10Ω<R≤100Ω: ±300ppm/°C >100Ω: ±200ppm/°C **PF01:** 1Ω≤R≤10Ω: -100~350ppm/°C >10Ω: ±200ppm/°C **PF02, PF03, PF05, PF06, PF07, PF10, PF11, PF12:** 1Ω≤R≤10Ω: ±400ppm/°C 10Ω<R≤100Ω: ±200ppm/°C >100Ω: ±100ppm/°C
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)

P F 0 2 W G J 0 2 2 J T C E

Product Type (产品类型):
Fill-in 4 digits with the Chip resistor type as follow (填四位数表示下列各种晶片电阻类型):
01005=PF0A 0201=PF01
0402=PF02 0603=PF03
0805=PF05 1206=PF06
1210=PF07 1812=PF11
2010=PF10 2512=PF12

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

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
D =20,000pcs

Tolerance (公差):
F = ±1%
J = ±5%

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

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 。

High-Precision Thin Film Chip Resistors - TC

高精密薄膜晶片电阻器-TC系列

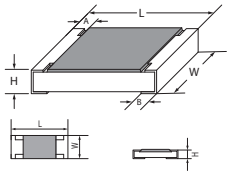
Feature (特性)

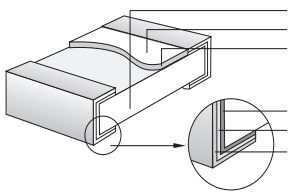
- Thin film NiCr Resistance element
  薄膜镍铬阻抗组件
- Very tight tolerance ±0.05% ~ ±1%
  高精密的公差 ±0.05% ~ ±1%
- Extremely low TCR ±5ppm~±50ppm
  极低的温度系数 ±5ppm~±50ppm
- Completed Lead-free 完全无铅产品

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

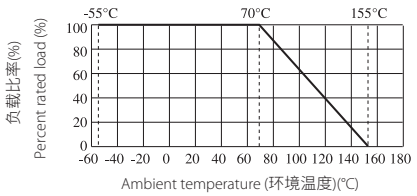
Figures (型状)





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	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

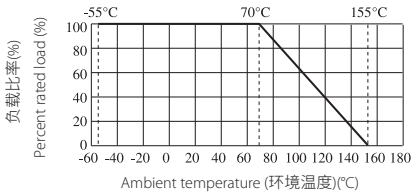
Feature (特性)

- 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

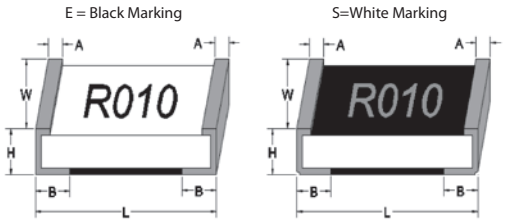
Application (应用)

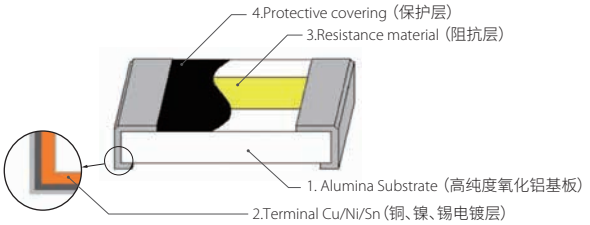
- Mobile electronic equipment-Cellular phone, NB Tablet PC, GPS,DSC, HDD
  移动电话、平板计算机、GPS、DSC、硬盘驱动器
- DC-DC converter, Adapter, Battery pack and charger
  直流转换器、适配器、电池和充电器
- Switching power supply 开关电源
- Voltage Regulation module 电压调整模块
- Power management applications 电源管理应用

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

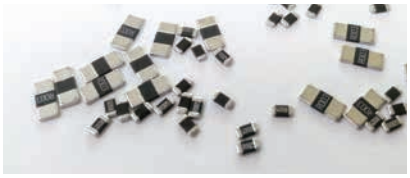
Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明 。

Metal Strip Chip Resistors - LR

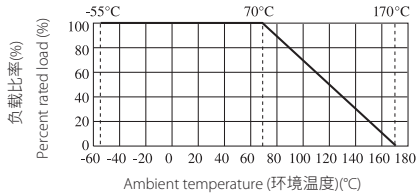
合金体电阻 - LR系列

Feature (特性)

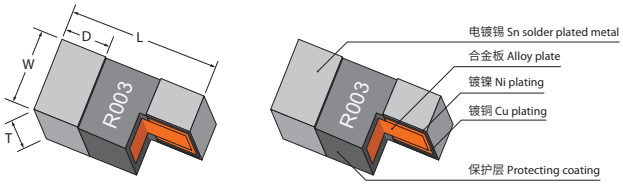
- High power rating up to 3 watts 高功率可达 3W
- Low T.C.R until ±50PPM 较低的温度系数 ±50PPM
- Low resistance values, from 0.5mΩ to 15mΩ 阻值低 0.5mΩ~15mΩ
- low inductance 低电感
- Tolerance: ±1%, ±2%, ±5% 精度 : ±1%, ±2%, ±5%
- RoHS complaint 符合欧盟 ROHS 标准



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						

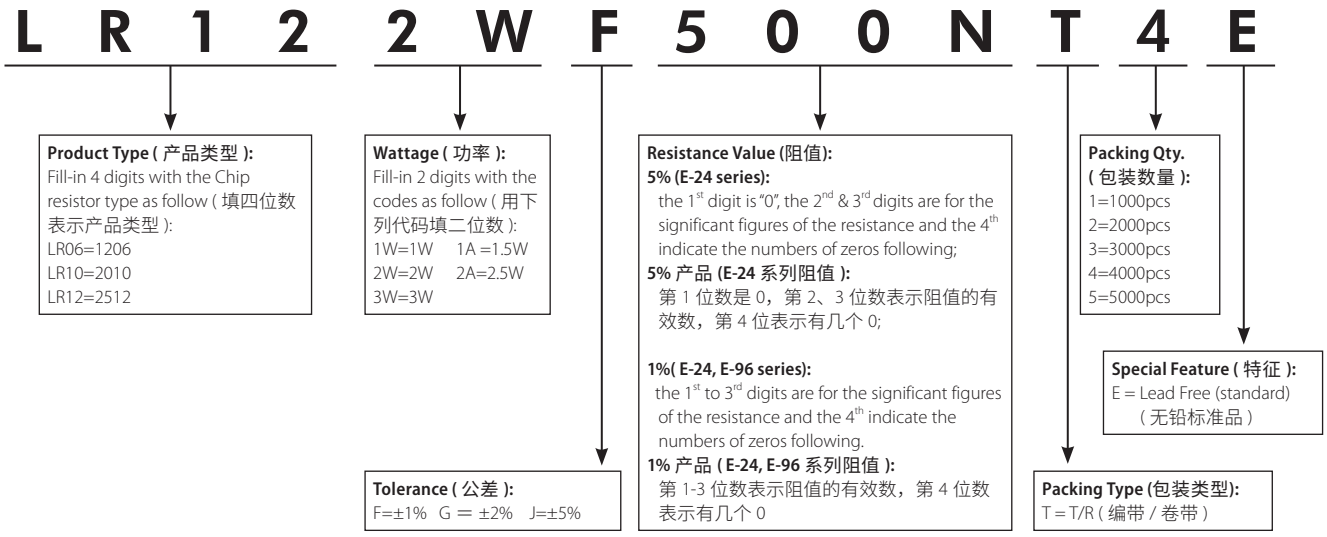
Note: LR12 2W special TCR available case by case on basis. Standard Operating Temp -55°C~+170°C
注意: LR12 2 W 特殊 TCR 可以特别提供。标准的工作温度 -55°C ~ + 170°C

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)



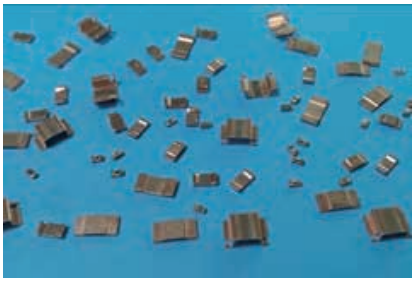
Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明。

Chip Resistors Shunt (RS)

贴片分流电阻器 (RS)

Feature (特性)

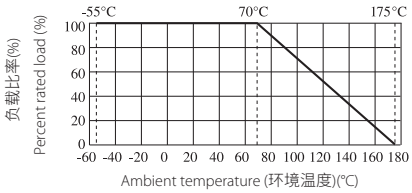
- Electron beam welding structure, stable performance
  电子束焊结构, 性能稳定
- RoHS complaint
  符合欧盟 ROHS 标准
- Very low resistance
  极低电阻值



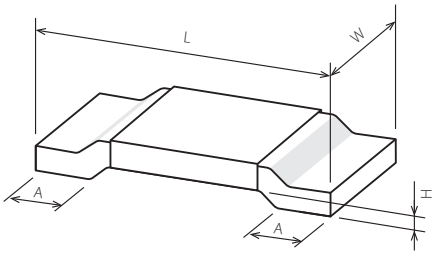
Application (应用)

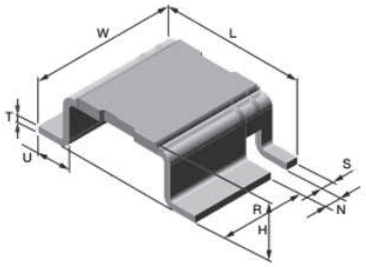
- Used in automobiles,fan,lighting
  应用于汽车、风机、照明
- Current module,electric welding machine,electric tool industry applications
  电流模块, 电焊机, 电动工具领域应用
- There are two side and four end structures
  有二端及四端引线结构

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

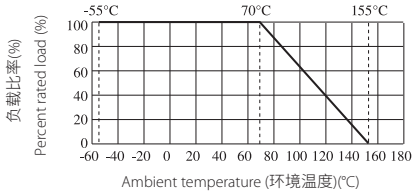
Feature (特性)

- 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

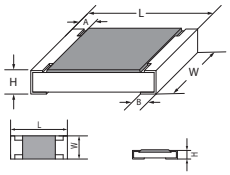
Application (应用)

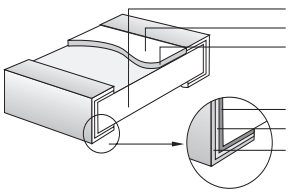
- Intelligent home appliances 智能家电产品
- High-end computer 电脑终端
- Medical equpment 医疗设备
- Industrial equpment 工业设备
- Outdoor electronic application 电子门禁

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°C/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°C, 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°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(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°C±2°C 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)

C 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) :
CQ02, CQ03, CQ05, CQ06, CQ07, CQ10 , CQ12

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

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 。

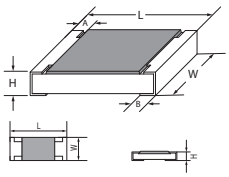
Automotive High Power Thick Film Chip Resistors - HQ

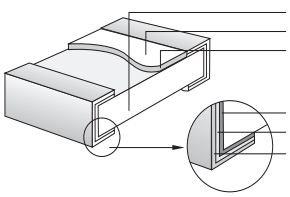
汽车级高功率晶片电阻器 - HQ系列

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

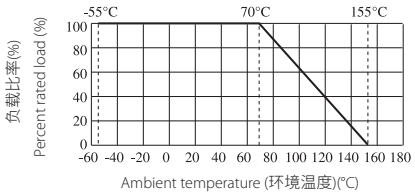
Figures (型状)





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 。

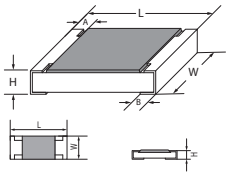
Automotive Low Resistance Thick Film Chip resistor -CS

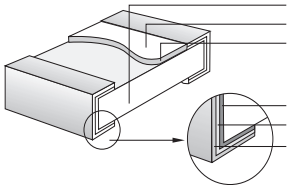
汽车级低阻厚膜晶片电阻-CS系列

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

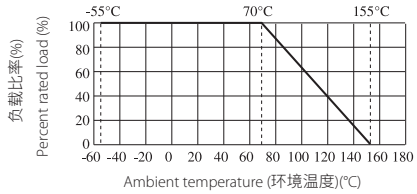
Figures (型状)





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°C~155°C
CS03	300V	-55°C~155°C
CS05	500V	-55°C~155°C
CS06	500V	-55°C~155°C
CS07	500V	-55°C~155°C
CS10	500V	-55°C~155°C
CS11	500V	-55°C~155°C
CS12	500V	-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)	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)

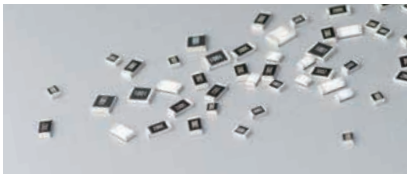
Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明 。

Anti-Sulfurized Automotive Thick Film Chip Resistors - NQ

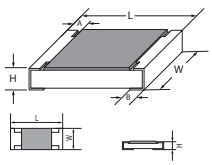
抗硫化汽车级晶片电阻器 - NQ系列

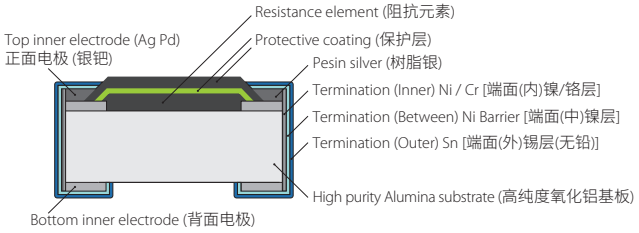
Feature (特性)

- 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

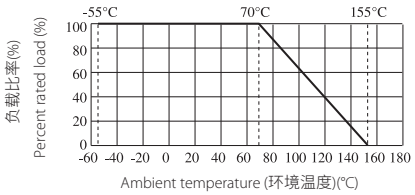


Figures (型状)





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)

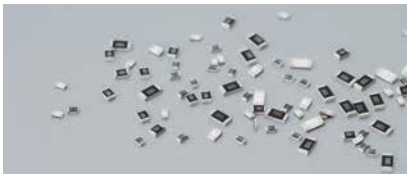
Remark: Please refer to page 141 for ordering guide. 注：下单请详见 P141 页说明 。

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

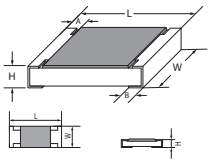
高品质抗硫化汽车级晶片电阻器 - NS系列

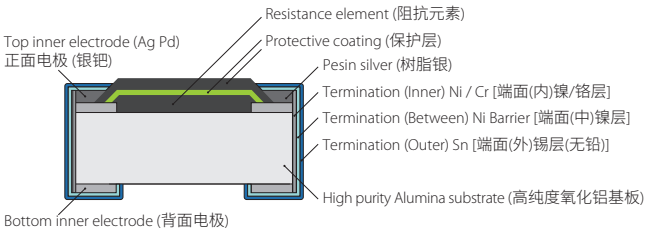
Feature (特性)

- 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

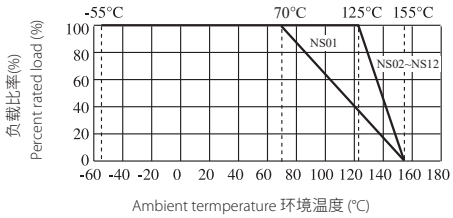


Figures (型状)

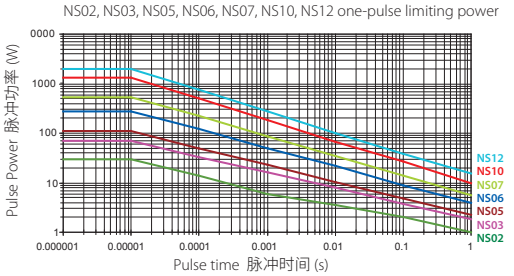




Derating Curve (降功率曲线)



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**	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)

N S 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) :
NS01, NS02, NS03, NS05, NS06, NS07, NS10, NS12

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 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-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 = 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 。

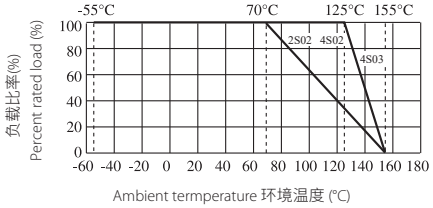
Anti-Sulfurized Thick Film Chip Resistor Array-Convex Terminal

抗硫化厚膜晶片排列电阻器

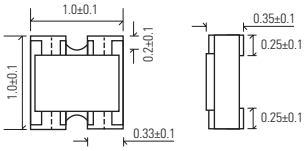
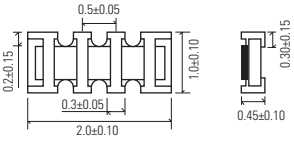
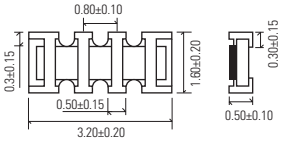
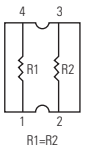
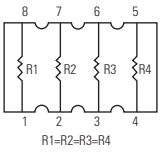
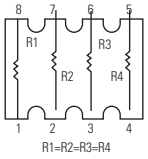
Feature (特性)

- 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 。

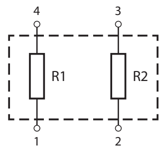
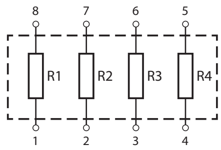
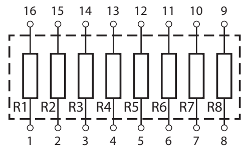
Chip Resistor Array

晶片排列电阻器

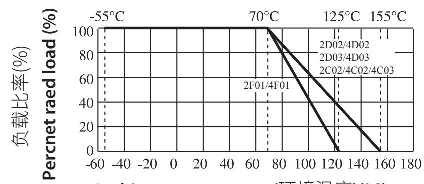
Feature (特性)

- 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

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±0.100.45±0.10//0.15±0.10/0.30±0.104C03 0603*4			0.60±0.10	/	/	0.30±0.20	/	0.40±0.10
2F01±0.100.45±0.10//0.15±0.10/0.30±0.104C03 0603*4			0.60±0.10	/	/	0.30±0.20	/	0.40±0.10
2F01±0.100.45±0.10//0.15±0.10/0.30±0.104C03 0603*4			0.60±0.10	/	/	0.30±0.20	/	0.40±0.10
2F01±0.100.45±0.10//0.15±0.10/0.30±0.104C03 0603*4			0.60±0.10	/	/	0.30±0.20	/	0.40±0.10
2F01±0.100.45±0.10//0.15±0.10/0.30±0.104C03 0603*4			0.60±0.10	/	/	0.30±0.20	/	0.40±0.10
2F01±0.100.45±0.10//0.15±0.10/0.30±0.104C03 0603*4			0.60±0.10	/	/	0.30±0.20	/	0.40±0.10
2F01±0.100.45±0.10//0.15±0.10/0.30±0.104C03 0603*4			0.60±0.10	/	/	0.30±0.20	/	0.40±0.10
2F01±0.100.45±0.10//0.15±0.10/0.30±0.104C03 0603*4			0.60±0.10	/	/	0.30±0.20	/	0.40±0.10
2F01±0.100.45±0.10//0.15±0.10/0.30±0.104C03 0603*4			0.60±0.10	/	/	0.30±0.20	/	0.40±0.10
2F01±0.100.45±0.10//0.15±0.10/0.30±0.104C03 0603*4			0.60±0.10	/	/	0.30±0.20	/	0.40±0.10
2F01±0.100.45±0.10//0.15±0.10/0.30±0.104C03 0603*4			0.60±0.10	/	/	0.30±0.20	/	0.40±0.10
2F01±0.100.45±0.10//0.15±0.10/0.30±0.104C03 0603*4			0.60±0.10	/	/	0.30±0.20	/	0.40±0.10
2F01±0.100.45±0.10//0.15±0.10/0.30±0.104C03 0603*4			0.60±0.10	/	/	0.30±0.20	/	0.40±0.10
2F01±0.100.45±0.10//0.15±0.10/0.30±0.104C03 0603*4			0.60±0.10	/	/	0.30±0.20	/	0.40±0.10
2F01±0.100.45±0.10//0.15±0.10/0.30±0.104C03 0603*4			0.60±0.10	/	/	0.30±0.20	/	0.40±0.10
2F01±0.100.45±0.10//0.15±0.10/0.30±0.104C03 0603*4			0.60±0.10	/	/	0.30±0.20	/	0.40±0.10
2F01±0.100.45±0.10//0.15±0.10/0.30±0.104C03 0603*4			0.60±0.10	/	/	0.30±0.20	/	0.40±0.10

Ceramic Rods For Resistors (电阻器用陶瓷基体)

	Ceramic Rod (瓷棒)	146	1.3×2.7, 1.7×5.2, 1.7×5.5, 1.7×6.0, 2.0×7.5, 2.0×8.0, 2.5×8.0, 3.0×8.0, 3.0×10, 3.5×10, 4.0×14, 5.0×16, 7.0×23

Capped & Sorted Ceramic Rod (组帽棒)

	White Capped Ceramic Rod (组帽瓷棒)	148	1.3×2.7, 1.7×5.2, 1.7×5.5, 1.7×6.0, 2.0×7.5, 2.0×8.0, 2.5×8.0, 3.0×8.0, 3.0×10, 3.5×10, 4.0×14, 5.0×16, 7.0×23
	Carbon Film Capped Ceramic Rod (碳膜组帽棒)	150	1.3×2.7, 1.7×5.2, 1.7×5.5, 1.7×6.0, 2.0×7.5, 2.0×8.0, 2.5×8.0, 3.0×8.0, 3.0×10, 3.5×10, 4.0×14, 5.0×16, 7.0×23
	Metal Film Capped Ceramic Rod (金属膜组帽棒)	152	1.3×2.7, 1.7×5.2, 1.7×5.5, 1.7×6.0, 2.0×7.5, 2.0×8.0, 2.5×8.0, 3.0×8.0, 3.0×10, 3.5×10, 4.0×14, 5.0×16, 7.0×23
	Metal Oxide Film Capped Ceramic Rod (金属氧化膜组帽棒)	154	1.3×2.7, 1.7×5.2, 1.7×5.5, 1.7×6.0, 2.0×7.5, 2.0×8.0, 2.5×8.0, 3.0×8.0, 3.0×10, 3.5×10, 4.0×14, 5.0×16, 7.0×23
	Capped Metal Glaze Film Rod (玻璃釉膜组帽棒)	156	1.3×2.7, 1.7×5.2, 1.7×5.5, 1.7×6.0, 2.0×7.5, 2.0×8.0, 2.5×8.0, 3.0×8.0, 3.0×10, 3.5×10, 4.0×14, 5.0×16
	Capped Chemical Deposited Film Rod (化学沉积膜组帽棒)	158	1.3×2.7, 1.7×5.2, 1.7×5.5, 1.7×6.0, 2.0×7.5, 2.0×8.0, 2.5×8.0, 3.0×8.0, 3.0×10, 3.5×10, 4.0×14, 5.0×16, 7.0×23
	Zero Ohm Rod (零歐姆棒)	160	1.3×2.7, 1.7×5.2

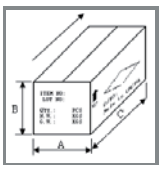
Tin-Plated Steel Cap (镀锡铁帽)

	Tin-Plated Steel Cap (镀锡铁帽)	162	Ø1.26, Ø1.64, Ø1.95, Ø2.45, Ø2.90, Ø3.41, Ø3.91, Ø4.90, Ø6.90

Ceramic Case (瓷壳)

	PRW series Case (PRW 系列瓷壳)	163	2W, 3W, 5W, 7W, 10W, 15W, 20W, 25W
	PRM series Case (PRM 系列瓷壳)	163	2W, 3W, 5W, 7W, 10W, 15W, 20W, 25W
	PRV series Case (PRV 系列瓷壳)	163	3W, 5W, 7W, 10W, 15W, 20W
	PRT series Case (PRT 系列瓷壳)	163	10W, 15W, 20W, 30W, 40W
	PFA series Case (PFA 系列瓷壳)	163	2W, 3W, 5W, 7W, 10W

Packing (包装)

	Ceramic Rod (瓷棒)	165
	Filmed & Capped Rod (组帽棒)	165
	Zero Ohm Rod (零欧姆棒)	166
	Tin-Plated Steel Cap (铁帽)	166

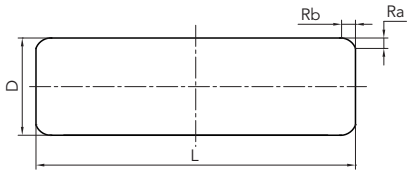
Material Characteristics Of Ceramics Rods
陶瓷棒特性表

Material 材质		Alumina 氧化铝瓷							
Product Code 产品代号		FS-25	FS-55	FS-70	FS-75	FS-80	FS-85	FS-92	FS-98
Chemical Analysis 主成份		AL_2O_3 25%	AL_2O_3 55%	AL_2O_3 70%	AL_2O_3 75%	AL_2O_3 80%	AL_2O_3 85%	AL_2O_3 92%	AL_2O_3 98%
Appearance 外观		Dense 致密质	Dense 致密质	Dense 致密质	Dense 致密质	Dense 致密质	Dense 致密质	Dense 致密质	Dense 致密质
Color 呈色		White 白色	White 白色	White 白色	White 白色	White 白色	White 白色	White 白色	White 白色
Features 特征		Good Heat Resistance, High Thermal Conductivity 耐热性优良，热传导性高							
Main Use 主要用途		Wire-wound Resistor 绕线电阻器用							
				Film Resistor 膜式电阻器用					
							Small-size & High power resistor 大功率小型化电阻器用		
Water Absorption 吸水率	%	≤ 0.02	≤ 0.02	≤0.01	≤0.01	≤0.01	≤0.01	< 0.02	< 0.02
Bulk Density 体积密度	g / cm^3	≥2.3	≥2.8	≥3.1	≥3.2	≥3.2	≥3.45	≥3.6	≥ 3.8
Thermal Expansion Coefficient 热膨胀系数	$\times10^{-6}$/°C (20-500°C)	> 4.0	> 5.5	> 6.1	> 6.7	> 7.0	> 7.3	> 7.0	> 7.7
Thermal Conductivity 热传导率	Cal/ cm.sec. °C	> 0.003	> 0.008	> 0.011	> 0.020	> 0.015	> 0.023	> 0.040	> 0.050
Dielectric Strength 绝缘强度	KV/mm	> 9	> 10	> 10	> 10	> 10	> 10	> 10	> 10
Dielectric Constant 绝缘常数	1MHZ	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5
Loss Rate 损失率	1MHZ	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0001	0.0001	0.0001
Anti-cross break strength 抗折力	Kg	> 9	> 10	> 12	> 12	> 16	> 16	> 16	> 16

Ceramic Rod
瓷棒

Feature (特性)

- Aluminum Content 70%, 80%, 85%. (70%, 80%, 85% 含铝量瓷棒)
- Electronic Ceramic parts in superior performance. (属于优良的电子陶瓷产品)
- Suitable for producing in different types of resistance film.
  (适合生产各种膜层的电阻)



Dimension (尺寸) (单位: mm)

NO	Size 规格	D 直径	L 长度	R	
				(Ra MIN 最小)	(Rb MAX 最大)
1	1.3×2.7	1.30±0.02	2.7±0.1	0.15	0.45
2	1.7×5.2	1.70±0.03	$5.2^{+0.1}_{-0.2}$	0.20	0.65
3	1.7×5.5	1.70±0.03	5.5±0.2	0.20	0.65
4	1.7×6.0	1.70±0.03	6.0±0.2	0.20	0.65
5	2.0×7.5	$2.00^{+0.04}_{-0.03}$	7.5±0.2	0.25	0.75
6	2.0×8.0	2.00±0.03	8.0±0.2	0.25	0.75
7	2.5×8.0	2.50±0.04	8.0±0.2	0.28	0.80
8	3.0×8.0	3.00±0.04	8.0±0.2	0.30	1.00
9	3.0×10	3.00±0.04	10.0±0.3	0.30	1.00
10	3.5×10	$3.50^{+0.04}_{-0.05}$	10.0±0.3	0.30	1.00
11	4.0×14	4.00±0.05	14.0±0.3	0.35	1.20
12	5.0×16	5.00±0.05	16.0±0.3	0.45	1.40
13	7.0×23	7.00±0.07	23.0±0.5	0.75	2.00

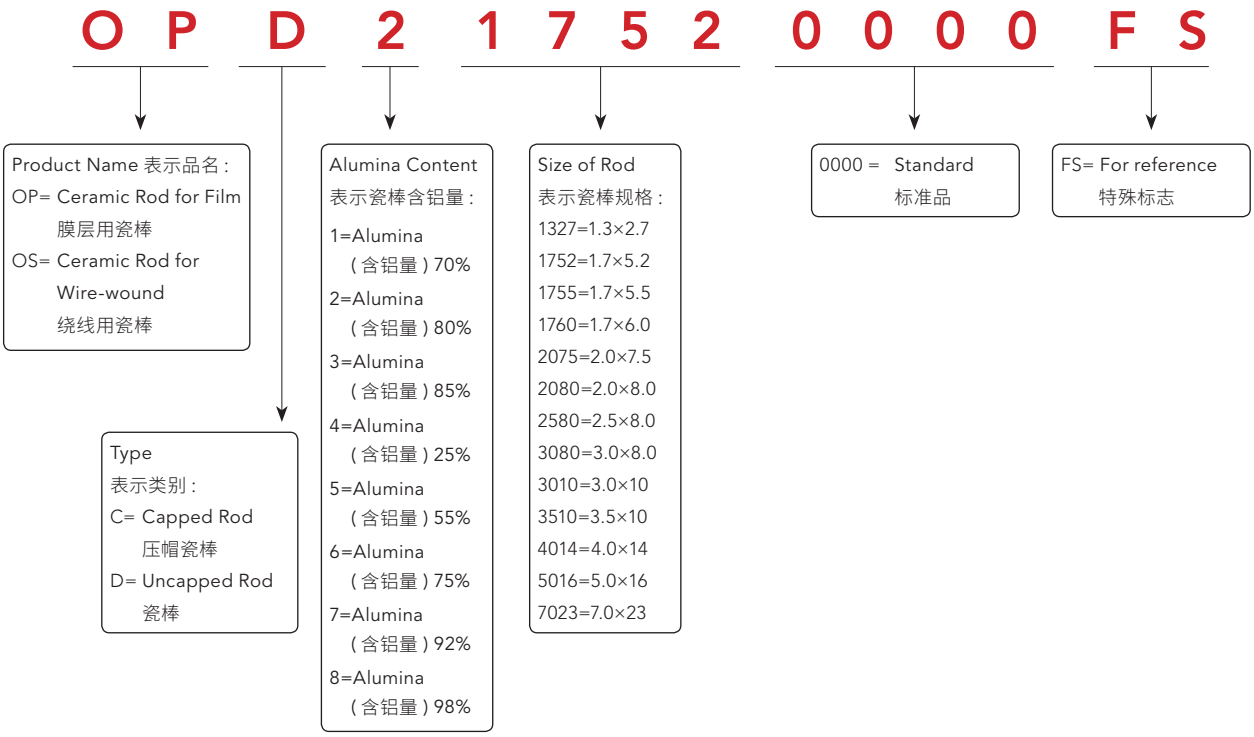
Remark: any special dimensions (4.0×12, 4.0×22, 4.0×39....) and Aluminum Content can be produced according to customer's request.
备注 : 特殊规格的尺寸 (4.0×12, 4.0×22, 4.0×39.....) 及公差和含铝量可以按客户的要求来生产。

Specification (产品规格)

Type （瓷 类）	Size （规 格）
FS-25 FS-55 FS-70	1.7×5.2, 1.7×5.5, 1.7×6.0, 2.0×7.5, 2.0×8.0, 2.5×8.0, 3.0×8.0, 3.5×10, 4.0×14, 5.0×16, 7.0×23
FS-75 FS-80	1.3×2.7, 1.7×5.2, 1.7×5.5, 1.7×6.0, 2.0×7.5, 2.0×8.0, 2.5×8.0, 3.0×8.0, 3.5×10, 4.0×14, 5.0×16, 7.0×23
FS-85 RS-92 FS-98	1.3×2.7, 1.7×5.2, 1.7×5.5, 1.7×6.0, 2.0×7.5, 2.0×8.0, 2.5×8.0, 3.0×8.0, 3.5×10, 4.0×14, 5.0×16, 7.0×23

Ordering Procedure (Example:OPD217520000FS)

订购方式 (例如: 膜层用 1.7×5.2 80% 瓷棒)

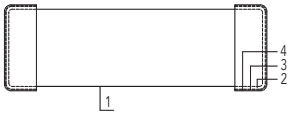


Remark: can produce other Alumina content product according to customer's request.
备注 : 可根据客户的要求订制其他含铝量的产品 .

Capped Ceramic Rod
组帽瓷棒

Feature (特性)

- Aluminum Content 70%, 80%, 85% (70%, 80%, 85% 含铝量白瓷棒)
- Electronic Ceramic parts in superior performance (属于优良的电子陶瓷产品)
- Suitable for producing in different types of Wire-wound resistors (适合生产绕线电阻)



1. Ceramic (瓷棒)
2. Cap (iron) (铁帽 . 铁)
3. Cap (copper) (铁帽 . 铜层)
4. Cap (tin) (铁帽 . 锡层)

Dimension (尺寸) (单位: mm)

NO	Size 规格	Capped Ceramic Rod 压帽瓷棒		MIN PULLING FORCE 最小拉力 (KG)
		D 直径	L 长度	
1	1.3×2.7	1.54~1.66	2.86~3.16	2
2	1.7×5.2	2.03~2.17	5.36~5.76	3
3	1.7×5.5	2.03~2.17	5.66~6.16	3
4	1.7×6.0	2.03~2.17	6.16~6.66	3
5	2.0×7.5	2.33~2.58	7.66~8.27	5
6	2.0×8.0	2.33~2.57	8.16~8.77	5
7	2.5×8.0	2.82~3.08	8.16~8.77	6
8	3.0×8.0	3.32~3.58	8.16~8.77	6
9	3.0×10	3.32~3.58	10.06~10.89	6
10	3.5×10	3.81~4.08	10.06~10.89	6
11	4.0×14	4.31~4.59	14.06~14.89	6
12	5.0×16	5.41~5.59	16.16~16.89	6
13	7.0×23	7.39~7.61	22.96~24.09	6

Ordering Procedure (Example: OSC14014000000)

订购方式 (例如 :4.0×14 规格 70% 组帽瓷棒)

O S C 1 4 0 1 4 0 0 0 0 0 0

Product Name
表示品名 :
OS= Ceramic Rod for Wire-wound
绕线用瓷棒

Type 表示类别 :
C= Capped Ceramic Rod 组帽

Alumina Content
表示瓷棒含铝量 :
1=Alumina (含铝量) 70%
2=Alumina (含铝量) 80%
3=Alumina (含铝量) 85%
4=Alumina (含铝量) 25%
5=Alumina (含铝量) 55%
6=Alumina (含铝量) 75%
7=Alumina (含铝量) 92%
8=Alumina (含铝量) 98%

Size of Rod 表示瓷棒规格 :
1327=1.3×2.7 1752=1.7×5.2
1755=1.7×5.5 1760=1.7×6.0
2075=2.0×7.5 2080=2.0×8.0
2580=2.5×8.0 3080=3.0×8.0
3010=3.0×10 3510=3.5×10
4014=4.0×14 5016=5.0×16
7023=7.0×23

0=Standard 标准品

Remark: can produce other Alumina content product according to customer's request.
备注 : 可根据客户的要求订制其他含铝量的产品 .

Technical parameter of Capped Rods in various film

各类膜层组帽棒技术参数

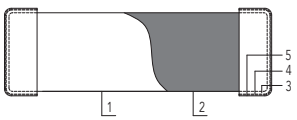
Type 膜层类型	Characteristic 膜层特点	Resistance range 电阻值范围 (Ω)	T.C.R. 电阻温度系数 (ppm/°C)	Limit of short time over load 短时间过载变化率
Film ceramic rods of carbon film resistor 碳膜	Conductive film made of high-heat temperature decompose carbon material 高温热分解碳质导电膜层 Ceramic rod with high-conduction material 高导热材料基体 Low cost 低成本	1Ω ~2.5Ω 2.6Ω ~800Ω 801Ω ~5KΩ 5.1KΩ ~ 120KΩ	±300 ±450 0 ~ -700 0 ~ -1500	≦ (1%+0.05Ω)
Film ceramic rods of metal film resistor 金属膜	Vacuum sputtering film ceramic rod adopted 采用真空溅射完成膜层 Ceramic rod with high-conduction material 高导热材料基体 Low current noise & T.C.R. 低电流噪声、低电阻温度系数 Wide resistance range:1Ω ~20KΩ 电阻值范围可达 :1Ω ~20KΩ	0.5Ω ~20KΩ	±15 ±25 ±50	≦ (0.5%+0.05Ω)
Film ceramic rods of metal oxide film resistor 金属氧化膜	Conductive film made of metal oxide fired at high temperature 金属氧化物高温烧成膜层 Good overload capacity 具有高温负荷能力 Ceramic rod with high-conduction material 高导热材料基体	2Ω ~500Ω	±350	Normal size 正常尺寸 ≦ (1%+0.05Ω) Small size 小尺寸≦ (2%+0.05Ω)
Film ceramic rods of Chemical Deposited Film resistors 化学沉积膜	Conductive film made of chemical plated metal 化学镀金属导电膜层 Ceramic rod with high-conduction material 高导热材料基体 Low cost 低成本	0.02Ω ~1.3Ω	±200	Normal size 正常尺寸 ≦ (1%+0.05Ω) Small size 小尺寸≦ (2%+0.05Ω)
Film ceramic rods of Metal Glaze film resistors 玻璃釉膜	Conductive film made of high temperature 高温烧成贵金属氧化物导电膜层 With high overload capacity 具有高过负荷能力 Wide resistance range:15Ω ~2.5MΩ 阻值范围 :15Ω ~2.5MΩ Small T.C.R.: ±100~200ppm/°C 温度系数小 :±100~200ppm/°C	15Ω ~1.3MΩ	±100 ±200	≦ (1%+0.05Ω)
OΩ resistors 零欧电阻	Conductive film made of chemical plated copper 化学镀铜导电膜层 Ceramic rod with high-conduction material 高导热材料基体 Low cost 低成本	≦ 50mΩ	/	/

Carbon Film Capped Ceramic Rod

碳膜组帽棒

Feature (特性)

- Filming in CVD technology (采用 CVD 技术成膜)
- Low cost, good performance at High Frequency (低成本 , 高频特性好)
- Wide IRV range, can be sorted accurately (初值范围宽 , 并可以精准分类)



1. Ceramic (瓷棒)
2. Film (膜层)
3. Cap (iron) （铁帽 . 铁)
4. Cap (copper) （铁帽 . 铜层)
5. Cap (tin) （铁帽 . 锡层)

Dimension (尺寸) (单位: mm)

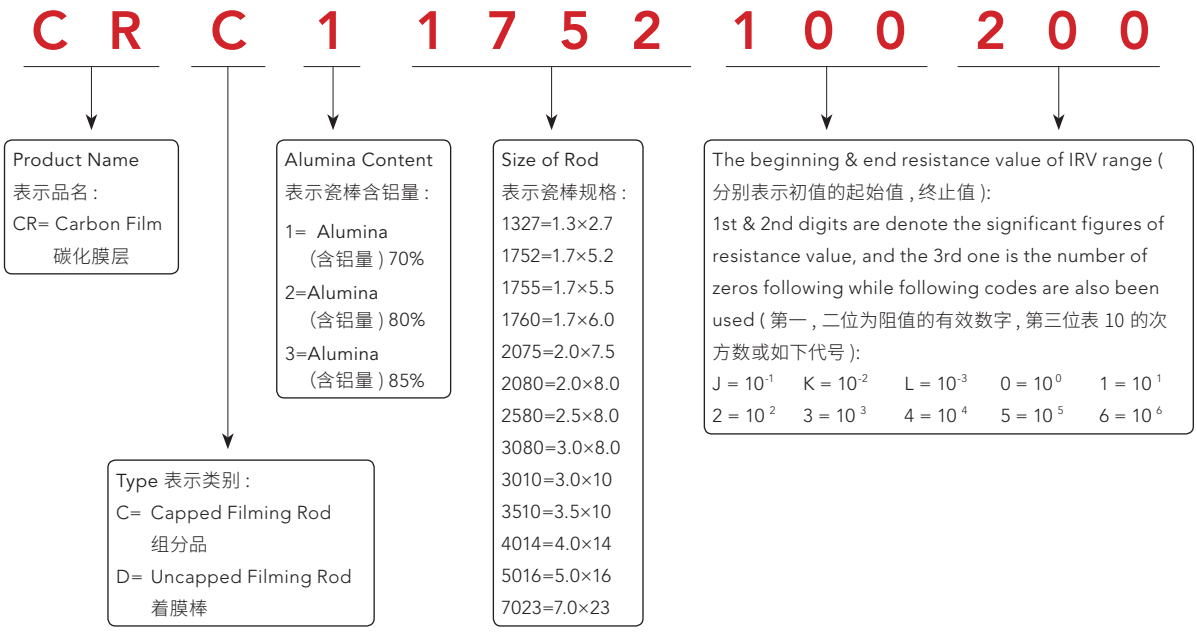
NO	Size 规格	Uncapped Filming Rod 着膜棒		Capped Filming Rod 组分品		MIN PULLING FORCE 最小拉力 (KG)
		D 直径	L 长度	D 直径	L 长度	
1	1.3×2.7	1.30±0.02	2.7±0.1	1.54~1.66	2.86~3.16	2
2	1.7×5.2	1.70±0.03	$5.2^{+0.1}_{-0.2}$	2.03~2.17	5.36~5.76	3
3	1.7×5.5	1.70±0.03	5.5±0.2	2.03~2.17	5.66~6.16	3
4	1.7×6.0	1.70±0.03	6.0±0.2	2.03~2.17	6.16~6.66	3
5	2.0×7.5	$2.00^{+0.04}_{-0.03}$	7.5±0.2	2.33~2.58	7.66~8.27	5
6	2.0×8.0	2.00±0.03	8.0±0.2	2.33~2.57	8.16~8.77	5
7	2.5×8.0	2.50±0.04	8.0±0.2	2.82~3.08	8.16~8.77	6
8	3.0×8.0	3.00±0.04	8.0±0.2	3.32~3.58	8.16~8.77	6
9	3.0×10	3.00±0.04	10.0±0.3	3.32~3.58	10.06~10.89	6
10	3.5×10	$3.50^{+0.04}_{-0.05}$	10.0±0.3	3.81~4.08	10.06~10.89	6
11	4.0×14	4.00±0.05	14.0±0.3	4.31~4.59	14.06~14.89	6
12	5.0×16	5.00±0.05	16.0±0.3	5.41~5.59	16.16~16.89	6
13	7.0×23	7.00±0.07	23.0±0.5	7.39~7.61	22.96~24.09	6

IRV (Initial Resistance Value) Range (初值范围)

1Ω-2Ω	8Ω-13Ω	60Ω-100Ω	500Ω-800Ω	4KΩ-7KΩ	30KΩ-60KΩ
1.5Ω-2.5Ω	10Ω-20Ω	80Ω-130Ω	600Ω-900Ω	5KΩ-10KΩ	40KΩ-80KΩ
2Ω-3.5Ω	15Ω-25Ω	100Ω-200Ω	800Ω-1.3KΩ	6KΩ-12KΩ	50KΩ-100KΩ
3Ω-5Ω	20Ω-30Ω	150Ω-250Ω	1KΩ-2KΩ	8KΩ-16KΩ	60KΩ-120KΩ
4Ω-7Ω	30Ω-50Ω	200Ω-400Ω	1.5KΩ-2.5KΩ	10KΩ-20KΩ	
5Ω-8Ω	40Ω-60Ω	300Ω-500Ω	2KΩ-4KΩ	15KΩ-30KΩ	
6Ω-10Ω	50Ω-80Ω	400Ω-600Ω	3KΩ-5KΩ	20KΩ-40KΩ	

Ordering Procedure (Example: CRC11752100200)

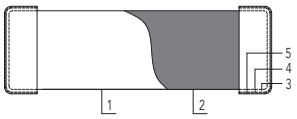
订购方式 (例如: CR 70% 1.7×5.2 10-20E)



Metal Film Capped Ceramic Rod
金属膜组帽棒

Feature (特性)

- Filming in PCD technology. (采用 PCD 成膜技术).
- Excellent Temperature coefficient, very low current noise. (温度系数范围低 , 电流噪声小).
- Wide IRV range, suitable to produce high precision product. (初值范围宽 , 适用于生产高精度产品)



1. Ceramic (瓷棒)
2. Film (膜层)
3. Cap (iron) （铁帽 . 铁)
4. Cap (copper) （铁帽 . 铜层)
5. Cap (tin) （铁帽 . 锡层)

Dimension (尺寸) (单位: mm)

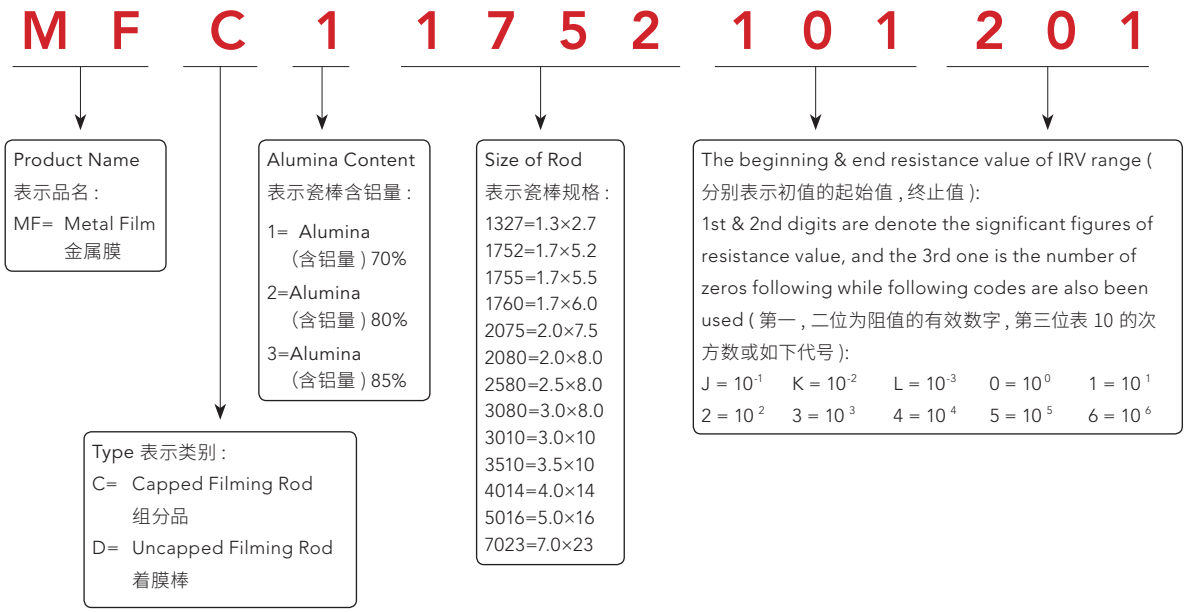
NO	Size 规格	Uncapped Filming Rod 着膜棒		Capped Filming Rod 组分品		MIN PULLING FORCE 最小拉力 (KG)
		D 直径	L 长度	D 直径	L 长度	
1	1.3x2.7	1.30±0.02	2.7±0.1	1.54~1.66	2.86~3.16	2
2	1.7x5.2	1.70±0.03	$5.2^{+0.1}_{-0.2}$	2.03~2.17	5.36~5.76	3
3	1.7x5.5	1.70±0.03	5.5±0.2	2.03~2.17	5.66~6.16	3
4	1.7x6.0	1.70±0.03	6.0±0.2	2.03~2.17	6.16~6.66	3
5	2.0x7.5	$2.00^{+0.04}_{-0.03}$	7.5±0.2	2.33~2.58	7.66~8.27	5
6	2.0x8.0	2.00±0.03	8.0±0.2	2.33~2.57	8.16~8.77	5
7	2.5x8.0	2.50±0.04	8.0±0.2	2.82~3.08	8.16~8.77	6
8	3.0x8.0	3.00±0.04	8.0±0.2	3.32~3.58	8.16~8.77	6
9	3.0x10	3.00±0.04	10.0±0.3	3.32~3.58	10.06~10.89	6
10	3.5x10	$3.50^{+0.04}_{-0.05}$	10.0±0.3	3.81~4.08	10.06~10.89	6
11	4.0x14	4.00±0.05	14.0±0.3	4.31~4.59	14.06~14.89	6
12	5.0x16	5.00±0.05	16.0±0.3	5.41~5.59	16.16~16.89	6
13	7.0x23	7.00±0.07	23.0±0.5	7.39~7.61	22.96~24.09	6

IRV (Initial Resistance Value) Range (初值范围)

0.5Ω-0.8Ω	4Ω-7Ω	20Ω-30Ω	100Ω-200Ω	600Ω-900Ω	4KΩ-7KΩ
0.8Ω-1.3Ω	5Ω-8Ω	30Ω-50Ω	150Ω-250Ω	800Ω-1.3KΩ	5KΩ-10KΩ
1Ω-2Ω	6Ω-10Ω	40Ω-60Ω	200Ω-400Ω	1KΩ-2KΩ	6KΩ-12KΩ
1.5Ω-2.5Ω	8Ω-13Ω	50Ω-80Ω	300Ω-500Ω	1.5KΩ-2.5KΩ	8KΩ-16KΩ
2Ω-3.5Ω	10Ω-20Ω	60Ω-100Ω	400Ω-600Ω	2KΩ-4KΩ	10KΩ-20KΩ
3Ω-5Ω	15Ω-25Ω	80Ω-130Ω	500Ω-800Ω	3KΩ-5KΩ	

Ordering Procedure (Example: MFC11752101201)

订购方式 (例如: MF 70% 1.7×5.2 100-200Ω)

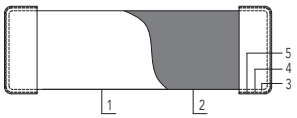


Metal Oxide Film Capped Ceramic Rod

金属氧化膜组帽棒

Feature (特性)

- Conductive Film Layer produced under High Temperature (高温烧成导电膜层)
- Good Performance under High Temperature environment (高温负荷能力强)
- First Choice for Power type resistor materials (功率型产品优选原料)



1. Ceramic (瓷棒)
2. Film (膜层)
3. Cap (iron) （铁帽 . 铁)
4. Cap (copper) （铁帽 . 铜层)
5. Cap (tin) （铁帽 . 锡层)

Dimension (尺寸) (单位: mm)

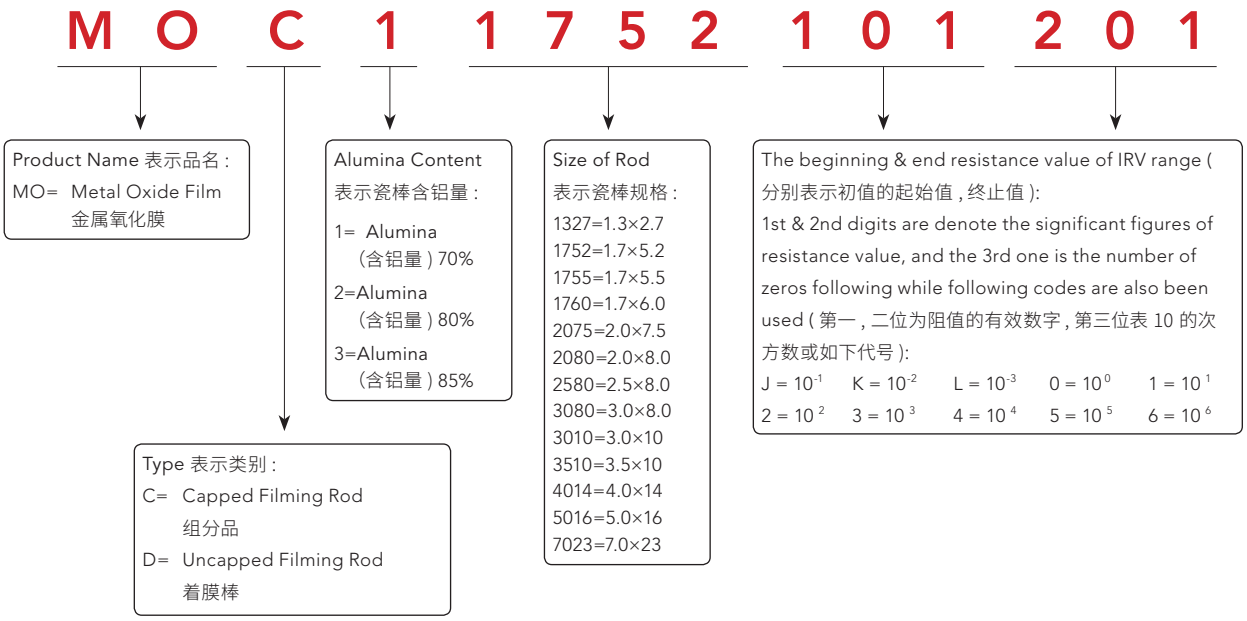
NO	Size 规格	Uncapped Filming Rod 着膜棒		Capped Filming Rod 组分品		MIN PULLING FORCE 最小拉力 (KG)
		D 直径	L 长度	D 直径	L 长度	
1	1.3×2.7	1.30±0.02	2.7±0.1	1.54~1.66	2.86~3.16	2
2	1.7×5.2	1.70±0.03	$5.2^{+0.1}_{-0.2}$	2.03~2.17	5.36~5.76	3
3	1.7×5.5	1.70±0.03	5.5±0.2	2.03~2.17	5.66~6.16	3
4	1.7×6.0	1.70±0.03	6.0±0.2	2.03~2.17	6.16~6.66	3
5	2.0×7.5	$2.00^{+0.04}_{-0.03}$	7.5±0.2	2.33~2.58	7.66~8.27	5
6	2.0×8.0	2.00±0.03	8.0±0.2	2.33~2.57	8.16~8.77	5
7	2.5×8.0	2.50±0.04	8.0±0.2	2.82~3.08	8.16~8.77	6
8	3.0×8.0	3.00±0.04	8.0±0.2	3.32~3.58	8.16~8.77	6
9	3.0×10	3.00±0.04	10.0±0.3	3.32~3.58	10.06~10.89	6
10	3.5×10	$3.50^{+0.04}_{-0.05}$	10.0±0.3	3.81~4.08	10.06~10.89	6
11	4.0×14	4.00±0.05	14.0±0.3	4.31~4.59	14.06~14.89	6
12	5.0×16	5.00±0.05	16.0±0.3	5.41~5.59	16.16~16.89	6
13	7.0×23	7.00±0.07	23.0±0.5	7.39~7.61	22.96~24.09	6

IRV (Initial Resistance Value) Range (初值范围)

2Ω-3.5Ω	8Ω-13Ω	40Ω-60Ω	150Ω-250Ω
3Ω-5Ω	10Ω-20Ω	50Ω-80Ω	200Ω-400Ω
4Ω-7Ω	15Ω-25Ω	60Ω-100Ω	300Ω-500Ω
5Ω-8Ω	20Ω-30Ω	80Ω-130Ω	
6Ω-10Ω	30Ω-50Ω	100Ω-200Ω	

Ordering Procedure (Example: MOC11752101201)

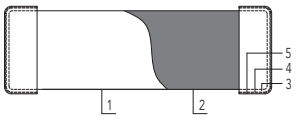
订购方式 (例如: MO 70% 1.7×5.2 100-200Ω)



Metal Glaze Capped Ceramic Rod
玻璃釉膜组帽棒

Feature (特性)

- Good performance against Humidity environment (耐湿特性好)
- Wide IRV range, can be sorted accurately
  (初值范围宽 , 并可以精准分类)
- Best choice for Anti-surge product （抗浪涌型产品的优选原料)



1. Ceramic (瓷棒)
2. Film (膜层)
3. Cap (iron) （铁帽 . 铁)
4. Cap (copper) （铁帽 . 铜层)
5. Cap (tin) （铁帽 . 锡层)

Dimension (尺寸) (单位: mm)

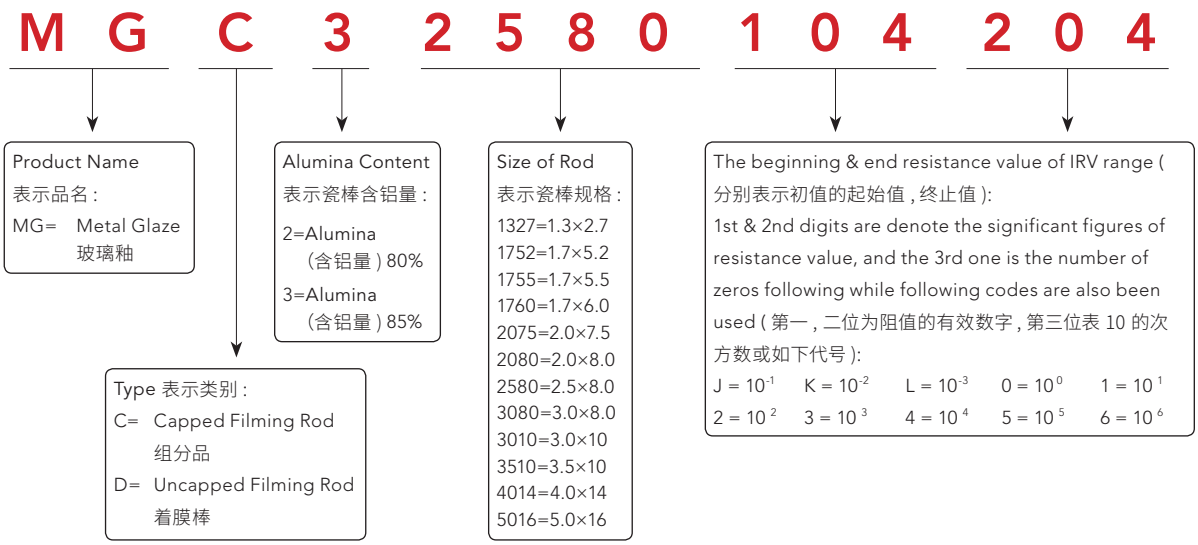
NO	Size 规格	Uncapped Filming Rod 着膜棒		Capped Filming Rod 组分品		MIN PULLING FORCE 最小拉力 (KG)
		D 直径	L 长度	D 直径	L 长度	
1	1.3×2.7	1.30±0.02	2.7±0.1	1.54~1.67	2.86~3.16	2
2	1.7×5.2	1.70±0.03	$5.2^{+0.1}_{-0.2}$	2.03~2.18	5.36~5.76	3
3	1.7×5.5	1.70±0.03	5.5±0.2	2.03~2.18	5.66~6.16	3
4	1.7×6.0	1.70±0.03	6.0±0.2	2.03~2.18	6.16~6.66	3
5	2.0×7.5	$2.00^{+0.04}_{-0.03}$	7.5±0.2	2.33~2.73	7.66~8.27	5
6	2.0×8.0	2.00±0.03	8.0±0.2	2.33~2.60	8.16~8.77	5
7	2.5×8.0	2.50±0.04	8.0±0.2	2.82~3.11	8.16~8.77	6
8	3.0×8.0	3.00±0.04	8.0±0.2	3.32~3.60	8.16~8.77	6
9	3.0×10	3.00±0.04	10.0±0.3	3.32~3.60	10.06~10.89	6
10	3.5×10	$3.50^{+0.04}_{-0.05}$	10.0±0.3	3.81~4.10	10.06~10.89	6
11	4.0×14	4.00±0.05	14.0±0.3	4.31~4.67	14.06~14.89	6
12	5.0×16	5.00±0.05	16.0±0.3	5.41~5.62	16.16~16.89	6

IRV (Initial Resistance Value) Range (初值范围)

15Ω-25Ω	200Ω-400Ω	3KΩ-5KΩ	40KΩ-80KΩ	500KΩ-800KΩ
20Ω-30Ω	300Ω-500Ω	4KΩ-7KΩ	50KΩ-100KΩ	600KΩ-900KΩ
30ΩE-50Ω	400Ω-600Ω	5KΩ-10KΩ	60KΩ-120KΩ	800KΩ-1.3MΩ
40Ω-60Ω	500Ω-800Ω	6KΩ-12KΩ	80KΩ-160KΩ	
50Ω-80Ω	600Ω-900Ω	8KΩ-16KΩ	100KΩ-200KΩ	
60Ω-100Ω	800Ω-1.3KΩ	10KΩ-20KΩ	150KΩ-300KΩ	
80Ω-130Ω	1KΩ-2KΩ	15KΩ-30KΩ	200KΩ-400KΩ	
100Ω-200Ω	1.5KΩ-2.5KΩ	20KΩ-40KΩ	300KΩ-500KΩ	
150Ω-250Ω	2KΩ-4KΩ	30KΩ-60KΩ	400KΩ-700KΩ	

Ordering Procedure (Example: MGC32580104204)

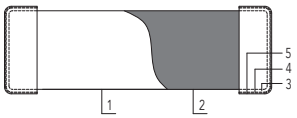
订购方式 (例如: MG 85% 2.5×8.0 100-200KΩ)



Chemical Nickel - Plating Film Capped Ceramic Rod
化学沉积膜组帽棒

Feature (特性)

- Conductive layer (Ni) deposited by Chemical method (化学镀镍形成导电膜层)
- Extremely Low Resistance value (超低阻值)
- Specially used for Low Resistance range product (其他膜层低阻部分的替代品)



1. Ceramic (瓷棒)
2. Film (膜层)
3. Cap (iron) （铁帽 . 铁)
4. Cap (copper) （铁帽 . 铜层)
5. Cap (tin) （铁帽 . 锡层)

Dimension (尺寸) (单位: mm)

NO	Size 规格	Uncapped Filming Rod 着膜棒		Capped Filming Rod 组分品		MIN PULLING FORCE 最小拉力 (KG)
		D 直径	L 长度	D 直径	L 长度	
1	1.3×2.7	1.28~1.33	2.7±0.1	1.54~1.67	2.86~3.16	2
2	1.7×5.2	1.67~1.74	$5.2^{+0.1}_{-0.2}$	2.03~2.18	5.36~5.76	3
3	1.7×5.5	1.67~1.74	5.5±0.2	2.03~2.18	5.66~6.16	3
4	1.7×6.0	1.67~1.74	6.0±0.2	2.03~2.18	6.16~6.66	3
5	2.0×7.5	1.97~2.19	7.5±0.2	2.33~2.73	7.66~8.27	5
6	2.0×8.0	1.97~2.06	8.0±0.2	2.33~2.60	8.16~8.77	5
7	2.5×8.0	2.46~2.57	8.0±0.2	2.82~3.11	8.16~8.77	6
8	3.0×8.0	2.96~3.06	8.0±0.2	3.32~3.60	8.16~8.77	6
9	3.0×10	2.96~3.06	10.0±0.3	3.32~3.60	10.06~10.89	6
10	3.5×10	3.45~3.56	10.0±0.3	3.81~4.10	10.06~10.89	6
11	4.0×14	3.95~4.13	14.0±0.3	4.31~4.67	14.06~14.89	6
12	5.0×16	4.95~5.08	16.0±0.3	5.41~5.62	16.16~16.89	6
13	7.0×23	6.93~7.10	23.0±0.5	7.39~7.64	22.96~24.09	6

IRV (Initial Resistance Value) Range (初值范围)

0.02Ω-0.03Ω	0.10Ω-0.20Ω	0.80Ω-1.3Ω
0.03Ω-0.05Ω	0.20Ω-0.30Ω	1.0Ω-2.0Ω
0.05Ω-0.07Ω	0.30Ω-0.50Ω	
0.07Ω-0.10Ω	0.50Ω-0.80Ω	

Ordering Procedure (Example: CNC1401480L13K)

订购方式 (例如: CN 70% 4.0×14 0.08-0.13Ω)

C N C 1 4 0 1 4 8 0 L 1 3 K

Product Name
表示品名 :
CN= Chemical Deposited (Ni)
化学镀镍

Type 表示类别 :
C= Capped Filming Rod
组分品
D= Uncapped Filming Rod
着膜棒

Alumina Content
表示瓷棒含铝量 :
1= Alumina (含铝量) 70%
2=Alumina (含铝量) 80%
3=Alumina (含铝量) 85%

Size of Rod
表示瓷棒规格 :
1327=1.3×2.7
1752=1.7×5.2
1755=1.7×5.5
1760=1.7×6.0
2075=2.0×7.5
2080=2.0×8.0
2580=2.5×8.0
3080=3.0×8.0
3010=3.0×10
3510=3.5×10
4014=4.0×14
5016=5.0×16
7023=7.0×23

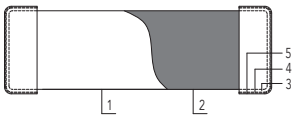
The beginning & end resistance value of IRV range (分别表示初值的起始值 , 终止值):
1st & 2nd digits are denote the significant figures of resistance value, and the 3rd one is the number of zeros following while following codes are also been used (第一 , 二位为阻值的有效数字 , 第三位表 10 的次方数或如下代号):

J = 10^{-1}	K = 10^{-2}	L = 10^{-3}	0 = 10^{0}	1 = 10^{1}
2 = 10^{2}	3 = 10^{3}	4 = 10^{4}	5 = 10^{5}	6 = 10^{6}

0Ω Resistor
0Ω 电阻

Feature (特性)

- Conductive layer formed by Copper Plating (or Tin plating) process (电镀铜层或锡层作为导电膜层)
- Resistance value can be lowest to mini ohm range (阻值可低至 mΩ)
- Ceramic rod core or Alloy rod core (陶瓷棒或合金棒作为基体材料)

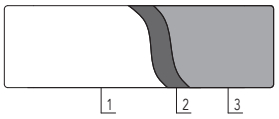


1. Ceramic (瓷棒)
2. Film (膜层)
3. Cap (iron) （铁帽 . 铁)
4. Cap (copper) （铁帽 . 铜层)
5. Cap (tin) （铁帽 . 锡层)

Copper Film Ceramic Rod 镀铜瓷棒 (单位: mm)

NO	Size 规格	Copper Film Ceramic Rod 镀铜瓷棒		Copper Film Capped Ceramic Rod 镀铜组帽棒	
		D 直径	L 长度	D 直径	L 长度
1	1.3x2.7	1.30±0.02	2.7±0.1	1.60~1.70	2.89~3.14
2	1.7x5.2	1.70±0.03	$5.2^{+0.1}_{-0.2}$	2.09~2.21	5.39~5.74

Tinned Iron Rod (镀锡铁棒)



1.Fe 铁棒 2.Cu 铜层 3.Sn 锡层

Tinned Iron Rod (镀锡铁棒) (单位: mm)

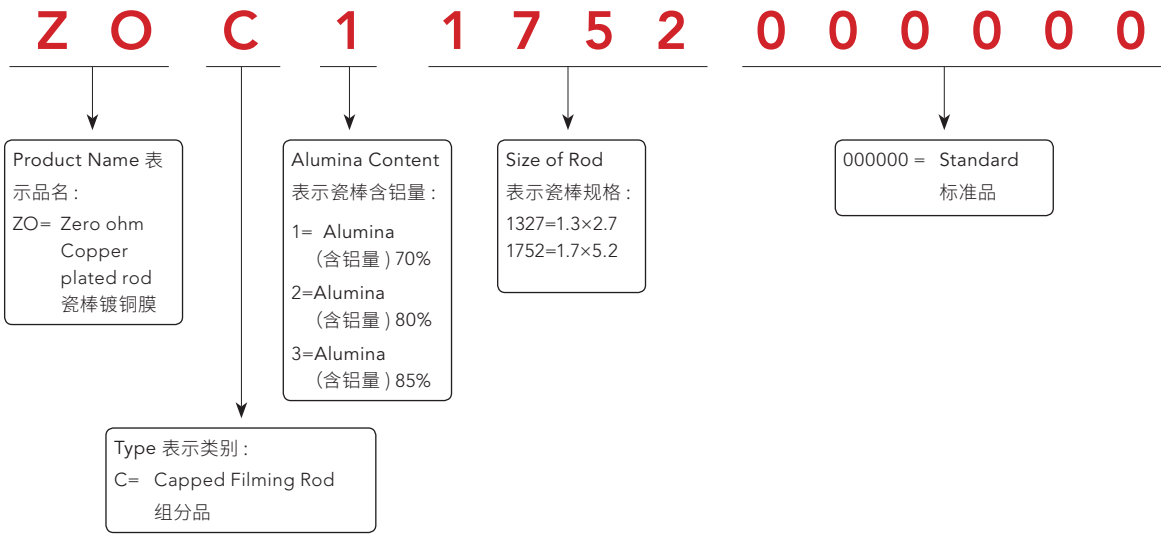
NO	Size 规格	Tinned Iron Rod 镀锡铁棒	
		D 直径	L 长度
1	1.3x2.7	1.50 ± 0.05	3.00 ± 0.05
2	1.7x5.2	2.00 ± 0.05	5.60 ± 0.05

IRV (Initial Resistance Value) Range (初值范围)

Standard resistance value <=50mE, other value or special structure can be specially provided
标准品阻值 ≤50mΩ, 其他阻值或特殊结构的要求可以特别提供

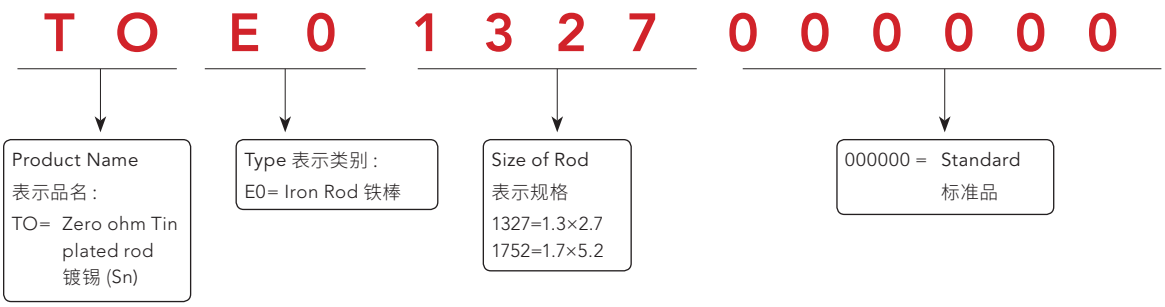
Ordering Procedure (Example: ZOC11752000000)

订购方式 (例如: ZO 70% 1.7×5.2 0Ω)



OrderingProcedure (Example: TOE01327000000)

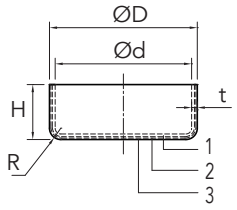
订购方式 (例如 :0Ω 1.3×2.7 镀锡铁棒)



Tin-Plated Steel Cap
铁帽

Feature (特性)

- Suitable for many different kinds of Electronic parts (适用各类电子产品)
- Full series in different size (规格齐全)
- Surface treatments in Tin & Copper Plating (表面经过镀铜镀锡处理)



1.Fe 铁
2.Cu 铜层
3.Sn 锡层

Dimension (尺寸) (单位: mm)

NO	Size 规格	ØD 直径	Ød 内径	H 高度	R(Max. 最大)	t±0.02
1	1.26 × 0.95	1.62±0.02	1.265±0.02	0.95±0.02	0.15	0.15
2	1.64 × 1.42	2.10±0.02	1.64±0.02	1.42±0.04	0.20	0.20
3	1.95 × 1.74	2.51±0.02	1.93±0.02	1.74±0.03	0.25	0.25
4	1.95 × 1.85	2.51±0.02	1.93±0.02	1.85±0.03	0.25	0.25
5	2.45 × 1.95	3.00±0.02	2.44±0.02	1.95±0.05	0.25	0.25
6	2.90 × 2.00	3.50±0.03	2.92±0.02	2.00±0.05	0.25	0.25
7	2.90 × 2.10	3.50±0.03	2.92±0.02	2.10±0.05	0.25	0.25
8	3.41 × 2.35	4.00±0.03	3.41±0.02	2.35±0.05	0.25	0.25
9	3.91 × 2.35	4.50±0.03	3.91±0.03	2.35±0.05	0.25	0.25
10	4.90 × 2.85	5.48±0.02	4.88±0.03	2.85±0.05	0.25	0.25
11	6.90 × 3.45	7.50±0.02	6.90±0.03	3.45±0.05	0.25	0.25

Ordering Procedure (Example: TOCA12600000FS)
订购方式 (例如: 镀锡铁帽 Ø1.26)

T O C A 1 2 6 0 0 0 0 0 F S

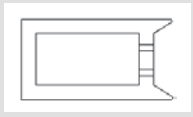
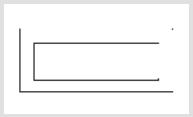
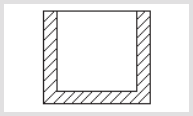
- **T O** — Product Name 表示品名 : TO= 镀锡 (Sn)
- **C** — Type 表示类别 : C= Cap 铁帽
- **A** — Thickness 表示厚度 A=0.15mm 厚 B=0.20mm 厚 C=0.25mm 厚
- **1 2 6 0** — Size 表示铁帽尺寸 : 1260= Ø1.26; 1640 = Ø1.64; 1950 = Ø1.95; 2450= Ø 2.45; 2900 = Ø2.90; 3910 = Ø3.91; 4900 = Ø4.90; 6900= Ø6.90
- **0 0 0 0** — 0000 for Steel Cap product. Can indicate the specified height in case for non-standard cap 无需描述添 0 补足 ---0000 指定高度 , 例 : 1900--- H1.90mm
- **F S** — FS= For reference 特殊标志

Remark: Special size can be provided according to customer's request
备注 : 特殊尺寸可以按客户的要求订制

Feature (特性)

- Superior Talc Material (优质滑石瓷原料)
- Full series in different size (规格齐全)
- Hot-briquetting & Dry-pressing two different process (热压和干压两种成形方式)

Type & Dimension (类型及尺寸) (单位: mm)

Type (类型)		功率	2W	3W	5W	7W	10W	15W	20W	25W	30W	40W
	PRW	L 长	18	22	22	35	49	49	60	64	-	-
		W 宽	7	8	10	10	10	12.5	14.5	14.5	-	-
		H 高	7	8	9	9	9	11.5	13.5	13.5	-	-
	PRM	L 长	20	25	25	38	50	-	45	-	-	-
		W 宽	11.5	12.5	12.5	12.5	12.5	-	20	-	-	-
		H 高	7.5	8.5	9	9	9	-	13.5	-	-	-
	PRV	L 长	-	22	27/25	35	48	48	63	-	-	-
		W 宽	-	10	10	10	10	12.5	12.5	-	-	-
		H 高	-	9	9	9	9	11.5	13.5	-	-	-
	PRT	L 长	-	-	-	-	48	48	63	-	75	90
		W 宽	-	-	-	-	10	12.5	12.5	-	19	19
		H 高	-	-	-	-	9	11.5	13.5	-	19	19
	PFA	L 长	13 / 26	13 / 26	14 / 26	26	26	-	-	-	-	-
		W 宽	5	5	5	5	-	-	-	-	-	-
		H 高	8.5 / 9	13.5 / 13	18	20	18	-	-	-	-	-

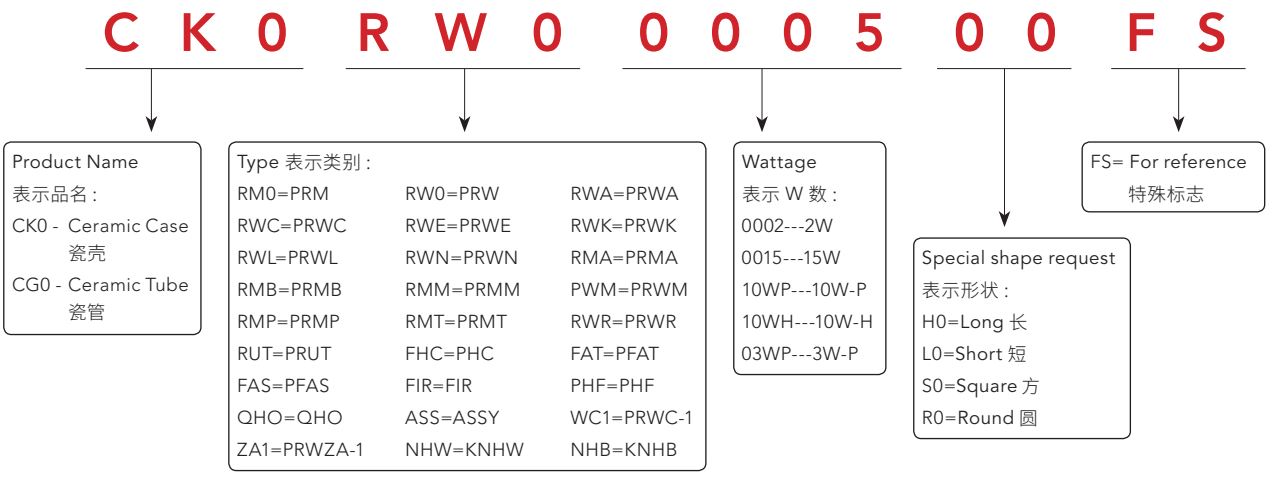
Remark: Special type and dimension can be orded by customer's request.
备注 : 特殊尺寸可以按客户的要求订制

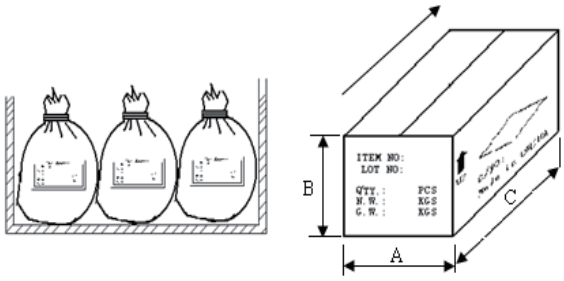
Performance Specifications (性能)

Item	项目	Unit 单位	Specification 标准
Bulk Density	体积密度	g/cm^3	≥ 2.8
Flexural Strength	抗折强度	MPa	139
Coefficient of Linear Thermal Expansion	线膨胀系数 (20~100°C)	$\times10^{-6}$/°C	7.3
Permittivity	介电常数 (1MHz 20°C)	F/M	6.2
Dielectric Loss Tangent	介质损耗角正切值	$\times10^{-4}$	13
Volume Resistivity	体积电阻率 (100°C)	Ω.cm	≥ 10^{12}
Dielectric Strength	击穿强度	K v /mm	≥ 20

Ordering Procedure (Example: CK0PRW0000500FS)

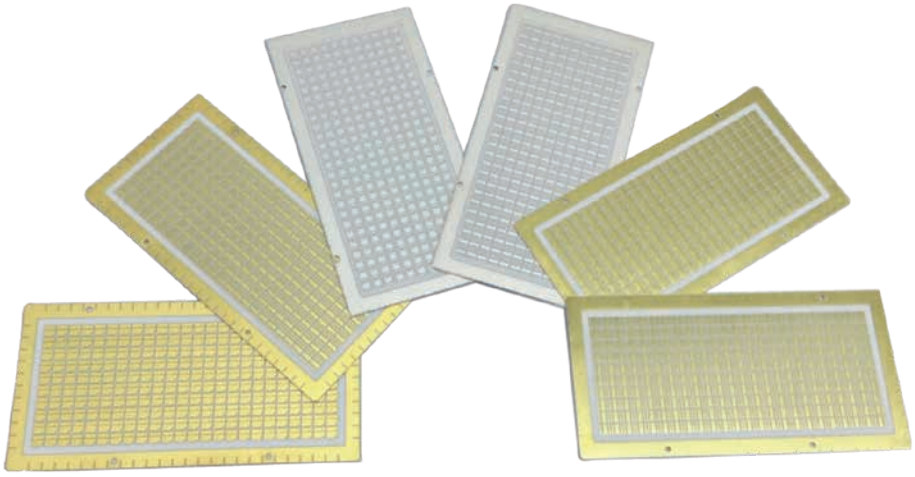
订购方式 (例如 :PRW5W 瓷壳)





Packing (标准包装方式)						
Tpye (类 型)		Size (尺寸) (mm)			Quantity (数量) (KPCS)	
Aluminum Content (瓷棒)						
		A	B	C	袋	盒
1	1.3 × 2.7	25	20	45	600	1800
2	1.7 × 5.2	25	20	45	200	600
3	1.7 × 5.5	25	20	45	200	600
4	1.7 × 6.0	25	20	45	200	600
5	2.0 × 7.5	25	20	45	100	300
6	2.0 × 8.0	25	20	45	100	300
7	2.5 × 8.0	25	20	45	60	180
8	3.0 × 8.0	25	20	45	40	120
9	3.0 × 10	25	20	45	40	120
10	3.5 × 10	25	20	45	25	75
11	4.0 × 14	25	20	45	12.5	37.5
12	5.0 × 16	25	20	45	7.5	22.5
13	7.0 × 23	25	20	45	2.5	7.5
Capped Ceramic Rod (组帽棒)						
1	1.3 × 2.7	25	20	45	600	1800
2	1.7 × 5.2	25	20	45	200	600
3	1.7 × 5.5	25	20	45	200	600
4	1.7 × 6.0	25	20	45	200	600
5	2.0 × 7.5	25	20	45	100	300
6	2.0 × 8.0	25	20	45	100	300
7	2.5 × 8.0	25	20	45	60	180
8	3.0 × 8.0	25	20	45	40	120
9	3.0 × 10	25	20	45	40	120
10	3.5 × 10	25	20	45	25	75
11	4.0 × 14	25	20	45	12.5	37.5
12	5.0 × 16	25	20	45	7.5	22.5
13	7.0 × 23	25	20	45	2.5	7.5

Packing (标准包装方式)						
Tpye (类 型)	Size (尺寸) (mm)				Quantity (数量) (KPCS)	
Zero Ohm product (0Ω 产品)						
Copper plated 0 ohm in Ceramic core 镀铜瓷棒	1.3 × 2.7	25	20	45	600	1800
Tin plated 0 ohm in Ceramic core 镀铜瓷棒	1.7 × 5.2	25	20	45	200	600
Copper plated 0 ohm in Steel core 铁棒鍍銅鍍錫	1.3 × 2.7	25	20	45	300	900
Tin plated 0 ohm in Steel core 铁棒鍍銅鍍錫	1.7 × 5.2	25	20	45	100	300
Tin-Plated Steel Cap (铁帽)						
1	1.26 × 0.95	25	20	45	1800	5400
2	1.64 × 1.42	25	20	45	900	2700
3	1.95 × 1.85	25	20	45	600	1800
4	2.45 × 1.95	25	20	45	250	750
5	2.90 × 2.10	25	20	45	200	600
6	3.41 × 2.35	25	20	45	150	450
7	3.91 × 2.35	25	20	45	120	360
8	4.90 × 2.85	25	20	45	80	240
9	6.90 × 3.45	25	20	45	40	120

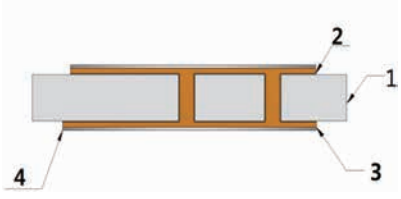


Technology Description (技术说明)

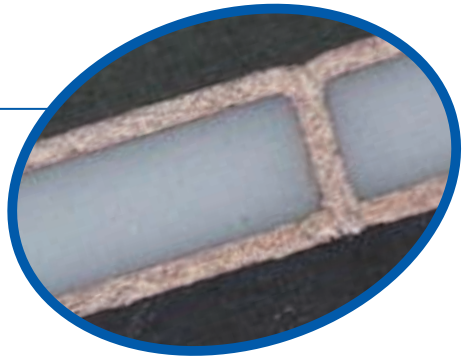
厚声采用半导体薄膜创新观念，开发直接电镀铜 (Direct Plating Copper, DPC) 陶瓷基板制程，完美的结合陶瓷散热及金属之特性。此制程利用溅镀及曝光显影方式在陶瓷基板上刻划出各种各样的电路图形，在经由电镀方式不仅可使金属与陶瓷两种不同属性之物质相互紧密结合，线路亦不易脱落 (结合力佳)。透过微显技术线路位置可更准确，线距更缩小之优点。主要应用于高亮度高功率 LED、微波无线通信、太阳能组件及半导体设备等领域。

Uni-Royal using the semiconductor thin-film innovative idea to develop the Direct Plating Copper (DPC) manufacturing process, in order to perform the excellent properties of metal and ceramic. This process developed by sputtering and exposure procedure to produce a wide variety of circuit pattern, by plating integrated the metal and ceramic properties, which the metallized metal will not be easy to peel off (good adhesion). Through this technology, the line position can be more accurately, and more narrow margin of line. Application mainly used in high brightness and high power LED, microwave radio Communication (Wireless) and semiconductor equipment, solar cell and other fields.

Thin Film Structures 薄膜结构



① Substrate 基板
② Sputter layer 溅镀层
③ Conductive layer 导电层
④ Surface Coating 表面金属层



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

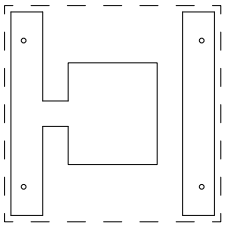
Item 项目	Reference Range 参考范围
Material 材质	AL_2O_3、ALN
Dimension & Thickness 尺寸厚度	Sheet size 4.5"114.3x114.3mm 0.38mm, 0.5mm, 1.0mm
Set-PIN 上机孔	Φ1、1.3、1.5、1.8、2mm Depending on the client machine 取决于客户机台
VIA diameter 导通孔径	75~150μm Depending on the customer requirement 依客户需求
Line spacing 线路间距	The smallest 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

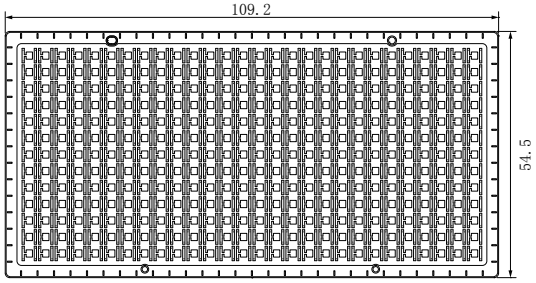
Reliability Test (可靠性测试)

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)

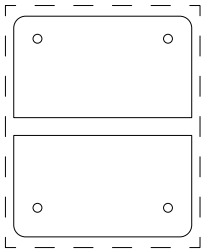
TYPE 1

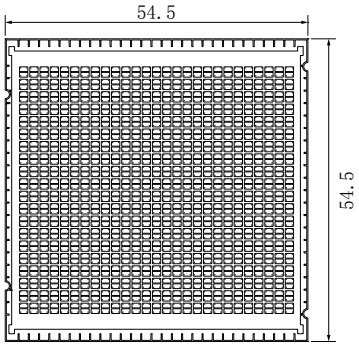




28×13=364 PCS

TYPE 2





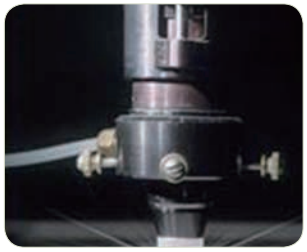
27×20=540 PCS

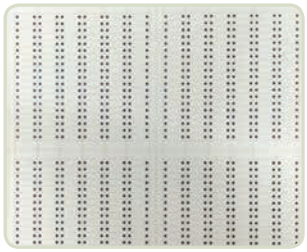
* Product drawing for reference only 产品图片仅供参考
* Custom Design Circuit could be available on a case to case basis. (可按客户特殊要求定制)

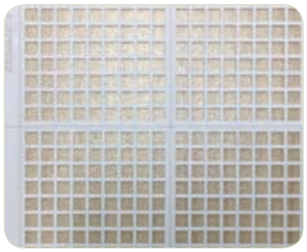
Ceramic Processing Parts (陶瓷加工件)

- ✓ 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)

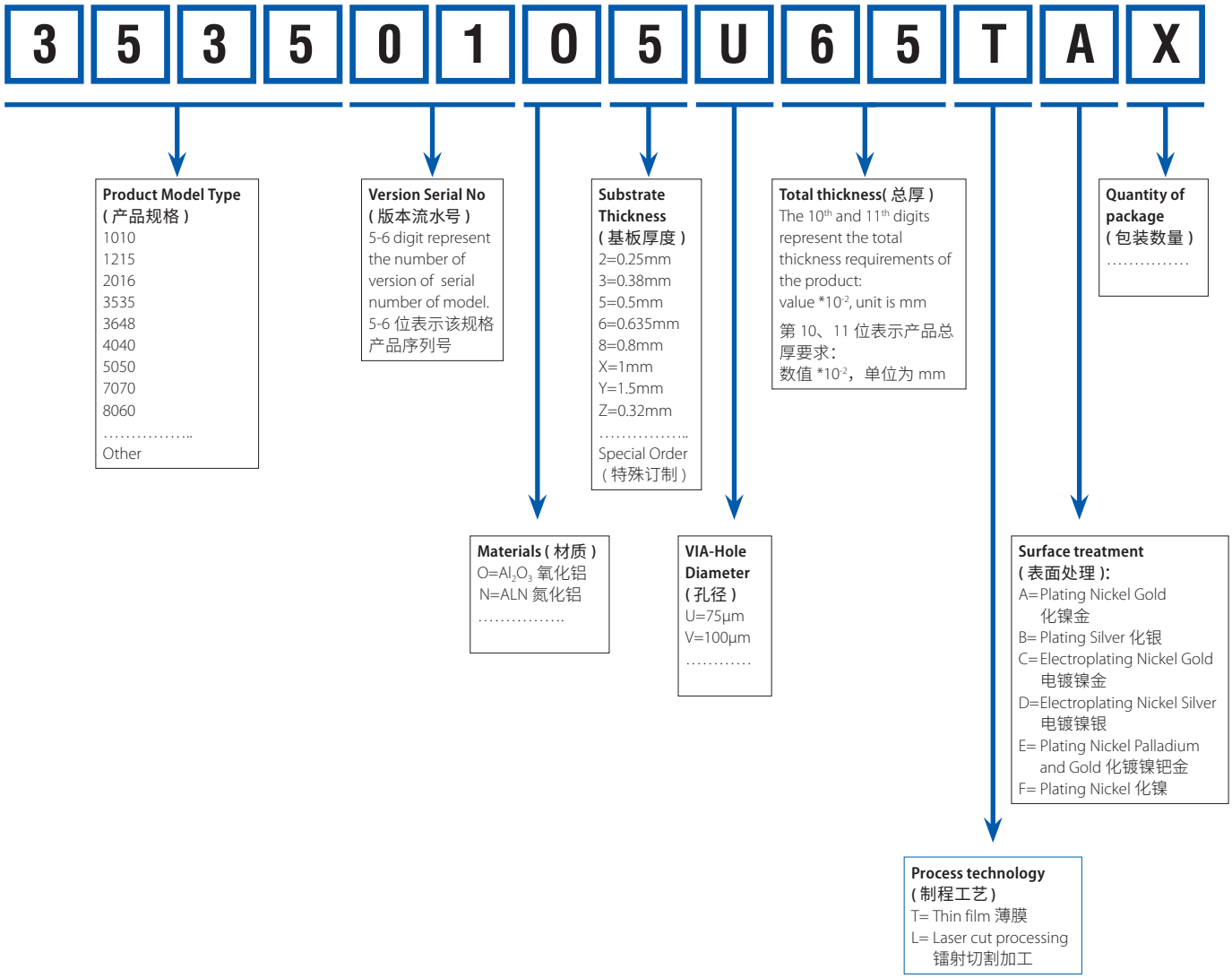
- ✓ Store under 25±5℃,50±10% RH when sealed (密封保存)
- ✓ The expiration date is less than 3 months when unsealed (不开封产品保质期在 3 个月以内)
- ✓ Store under 25±5℃,50±10%RH when unsealed (开封产品的储存条件)
- ✓ Please store unsealed package in airtight containers and try to used within 3 days (已开封产品请于 3 日内使用完，并在一个密闭容器内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

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

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