Thick Film Chip Resistors
厚膜晶片电阻器

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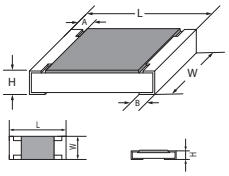
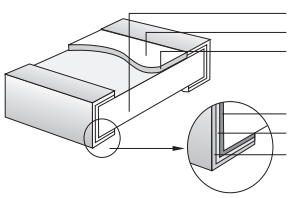
Feature (特性)

- 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, Digital CATV Receiver, Meter.
  应用于GPS、移动电话、PDA、机顶盒、仪表

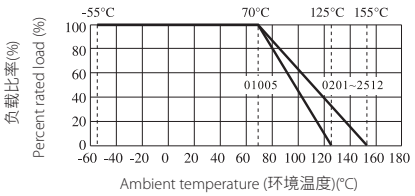
Figures (型状)





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 (mm)	L	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	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	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	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	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 额定功率	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)

- No marking on resistor body due to tiny size in 01005, 0201 and 0402 series.
  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

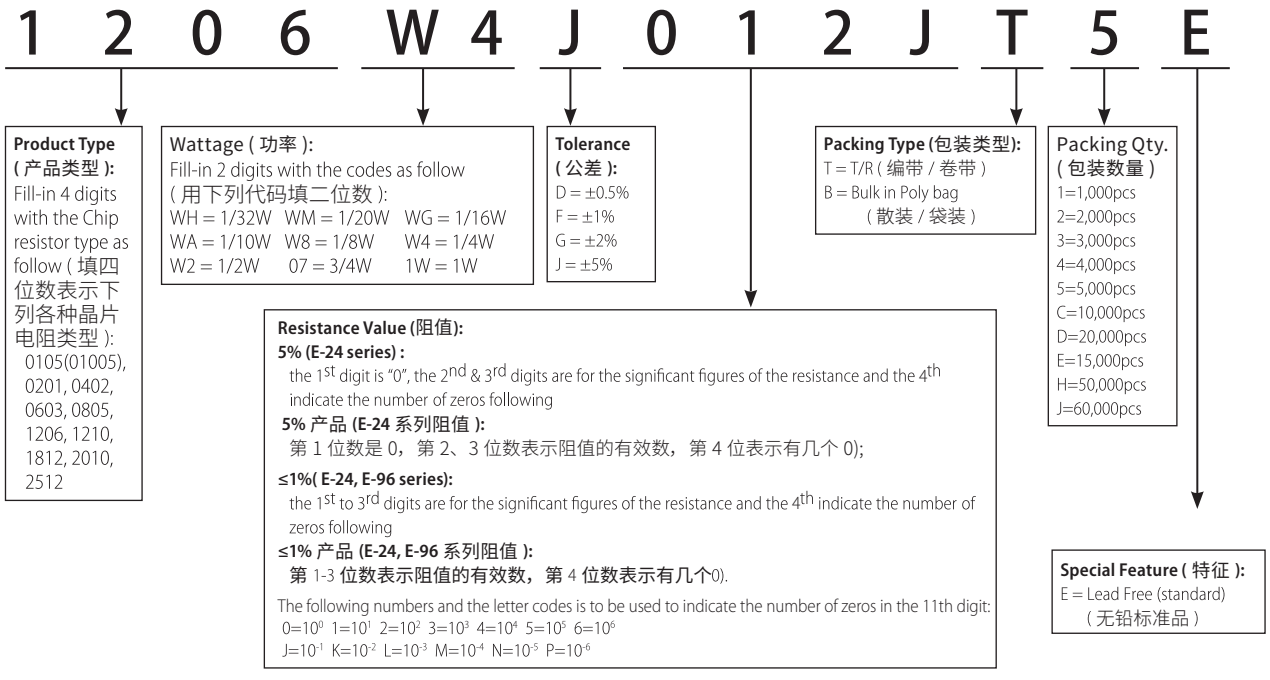
Performance Specifications (性能)

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)(-55°C~125°C)	
Humidity (Steady State)	**恒定湿热**	±5%, ± 2%: ±(3.0% + 0.05Ω) ±1%, ± 0.5%: ±(0.5% + 0.05Ω) 01005 ±5% ±1% : ±(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)

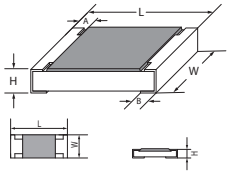


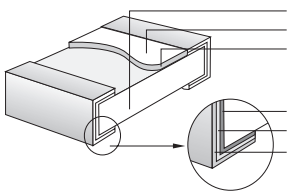
Remark: For more details, please check page 152, Part No. System. 注：更多细节详见P152标准料号系统。

Feature (特性)

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

Figures (型状)





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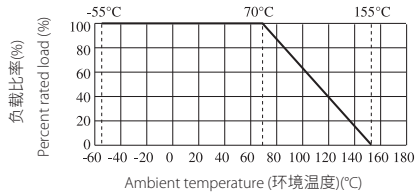
2. Protective coating (保护层)
3. Resistance element (阻抗元素)
4. Termination (Inner) Ni / Cr [端面(内)镍/铬层]
5. Termination (Between) Ni Barrier [端面(中)镍层]
6. Termination (Outer) Sn [端面(外)锡层(无铅)]

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



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

Type 类型	Size 尺寸	Power Rating 额定功率	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

New/Old Part No. (新旧料号对照)

New Part.no 新料号	Old Part.no 旧料号
0603WAJ**T5E**	0603SAJ****T5E /0603WGJ****T5E
0805W8***T5E**	0805S8*****T5E /0805WA*****T5E
1206W4***T5E**	1206S4*****T5E /1206W8*****T5E
1210W2***T5E**	1210U2*****T5E /1210S3*****T5E /1210W4*****T5E
181207***T4E**	1812W2*****T4E
201007***T4E**	201034*****T4E /2010W2*****T4E

Remark: The Old Part No. is still valid for the approved part.

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- Alternative Solution
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