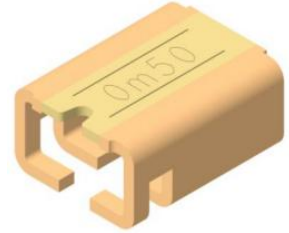


■片式分流电阻器（4 端子）— 1216

CHIP SHUNT RESISTOR (4 Terminal Kelvin) — 1216

●特征 Features

- | | |
|----------------------|--|
| * 最高功率达 5W | • High power up to 5W |
| * 4 端子开尔文结构 | • 4 Terminal Kelvin structure |
| * 电子束焊接结构 | • Electron-beam welding |
| * 低寄生电感小于 3 纳亨 | • Low inductance <3nH |
| * 适于作电流探测用电阻器，如电源电路等 | • Current detecting resistors for power supply, etc. |
| * 良好的长期稳定性 | • Good long-term stability |
| * 符合 RoHS 指令要求 | • Compliant with RoHS directive |
| * 符合 AEC-Q200 汽车标准条款 | • Compliant with AEC-Q200 standard |



◆应用领域 Application

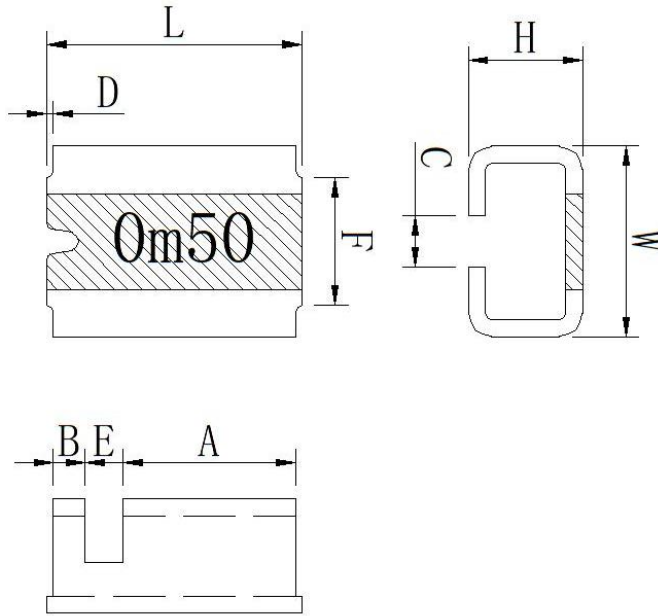
* 混合应用的电源电流传感器、变频器、电源模块、通信系统、自动化控制电源、汽车电子的高电流应用。

Current sensor for power hybrid applications, Frequency converters, Power modules, Communication system, Automatic control power supply, High current applications of automotive electronics

◆型号表示法 Part Number

MS	V	1216	K	R001	F	T				
↓	↓	↓	↓	↓	↓	↓				
产品代号 Product Code	额定功率代号 Power Rating Code		型号代号 Type Code		电阻值代号 Resistance Value Code		阻值误差精度代号 Resistance Tolerance Code		包装方式代号 Packing Style Code	
片式分流 电阻器 Chip Shunt Resistor	代号 Code	额定功率 系列 Power rating	代号 Code	型号 Type	代号 Code	T.C.R PPM/°C	代号 Code	误差精度 Tolerance	代号 Code	包装方法 Packing Style
	V	5W	1216	1216	X	±75	F	±1%	T	编带包装 Tape & Reel
					K	±100	J	±5%		
					J	±150				
单位Ω，小数点用R表示；单位mΩ，小数点用M表示； Units:Ω Decimal point should be Expressed “R” ； Units: mΩ Decimal point should be expressed by ‘M’ 例如Example: R001=0.001 Ω 0M50=0.50m Ω										

◆规格尺寸 Dimensions

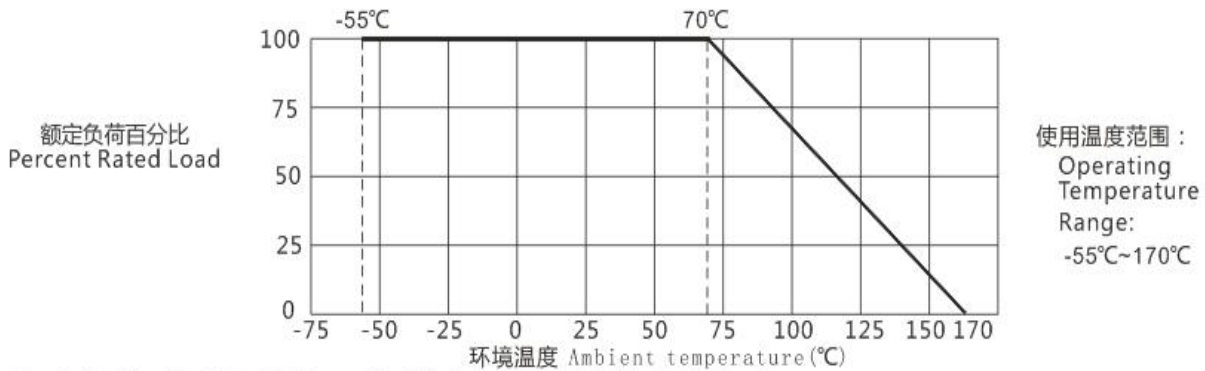


单位 Unit: mm

型号 Type	阻值 (mΩ)	电阻材料 Material	L	W	H	A	B	C	D	E
1216	0.3; 0.5; 1	MnCu	4.10±0.30	3.10±0.30	1.90±0.30	2.70±0.10	0.50±0.10	0.80±0.35	0.1±0.10	0.60±0.15
	2; 3	Karma								

◆产品特性曲线图 Product characteristic curve diagram

*负荷下降曲线 Derating Curve



◆电性能参数 Electrical Performance Parameters

型号 Type	额定功率(70℃) Power Rating	电阻值 Resistance Value	电阻温度系数TCR (PPM/℃)	使用温度范围 Operating Temp. Range
1216	5W	0.3mΩ; 0.5mΩ	±100; ±150	-55° C ~ +170° C
		1mΩ; 2mΩ; 3mΩ	±75; ±100	

◆可靠性测试方法 Reliability Test Method

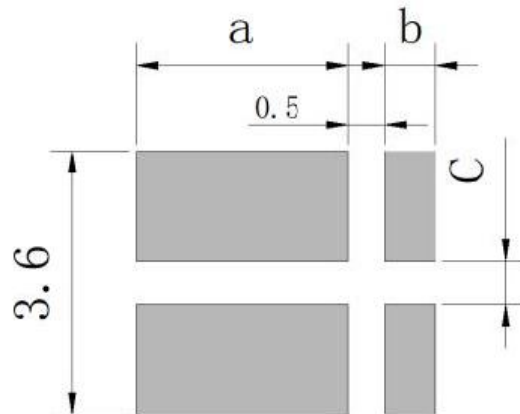
项目 Item	标 准 Specifications	测试方法 Test Methods
电阻温度系数 T.C.R	在规定值内 Within specified T.C.R	IEC 60115-1 6.2 +25°C/+125°C/+25°C
短时过负载 Short time overload	无可见损伤 No mechanical damage $\Delta R \leq \pm 1.0\%R$	IEC 60115-1 8.1 5倍额定功率, 保持5s。 5×Rated Power, for 5s.
可焊性 Solderability	可焊面积≥95% 95% Cover Min	IEC 60115-1 11.1 245°C±5°C锡槽, 保持3s±0.3s。 Lead-free solder bath at 245°C±5°C for 3s±0.3s.
耐焊接热 Resistance to Soldering Heat	无可见损伤 No mechanical damage $\Delta R \leq \pm 1.0\%R$	IEC 60115-1 11.2 270°C±5°C锡槽, 保持10s±1s。 Lead-free solder bath at 260°C±5°C for 10s±1s.
工作寿命 Operational Life	无可见损伤 No mechanical damage $\Delta R \leq \pm 1.0\%R$	AEC-Q200 Test 8/ MIL-STD-202 Method 108 125°C±2°C, 1000小时, 降额电流, 通1.5小时/断0.5小时。 125°C±2°C, 1000h, de-rated current for 1.5h ON/0.5h OFF.
高温高湿 Biased Humidity	无可见损伤 No mechanical damage $\Delta R \leq \pm 1.0\%R$	AEC-Q200 Test 7/MIL-STD-202 Method 103 温度85°C, 湿度85%RH的条件下施加10%额定功率(电流)或元件极限 电流(取较小值), 持续1000小时。 85°C/85%RH. 1000 hours, Apply 10% of operating power(current) or limiting element current whichever is lower.
温度循环 Temperature Cycling	无可见损伤 No mechanical damage $\Delta R \leq \pm 1.0\%R$	AEC-Q200 Test 4/ JESD22 Method JA-104 -55°C(30分钟)~常温(≤1分钟)~155°C(30分钟), 1000个循环。 -55°C(30min)~normal temperature(≤1min)~155°C(30min), 1000 cycles.
高温存储 High Temperature Exposure (Storage)	无可见损伤 No mechanical damage $\Delta R \leq \pm 1.0\%R$	AEC-Q200 Test 3 / MIL-STD-202 Method 108 1000小时 @ T=170°C, 不通电。 1000 hours. @ T=170° C. Unpowered.

◆包装 Packaging

包装方式见附录 Packaging can refer to the appendix.

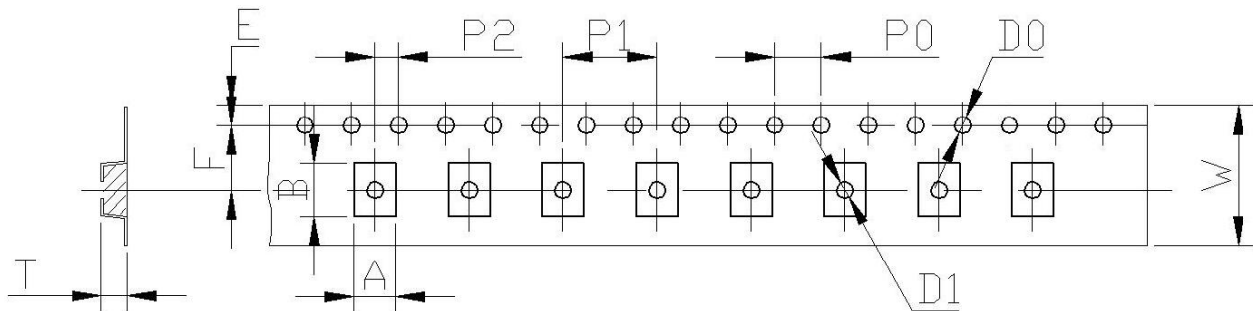
附录 Appendix I

◆推荐焊盘尺寸 Solder pad dimensions



型号 Type	阻值范围 (mΩ)	a (mm)	b (mm)	c (mm)
1216	0.3~3	2.95	0.7	0.6

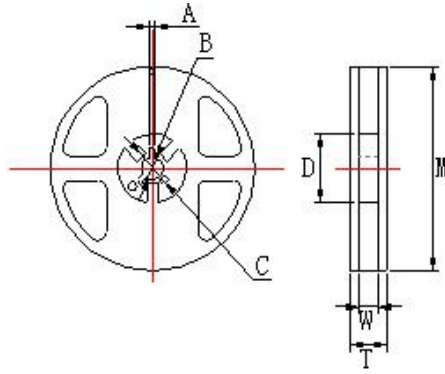
◆包装 Packaging



Unit: mm

型号 Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P0 (mm)	P1 (mm)	P2 (mm)	ØD0 (mm)	T (mm)	Quantity (EA)
1216	3.4±0.2	4.2±0.2	12.0±0.2	1.75±0.10	5.5±0.1	4.0±0.1	8.0±0.1	2.0±0.1	1.5±0.1	2.30±0.15	1000

* 卷盘 Reel



单位 unit: mm

卷盘尺寸 Reel Type	型号Type	M	W	T	A	B	C	D
7英寸 7inch dia.Reel	1216	178±2.0	9.5±1.0	12.5±1.5	2.0±0.5	13.0±0.5	21.0±0.5	58.0±2.0

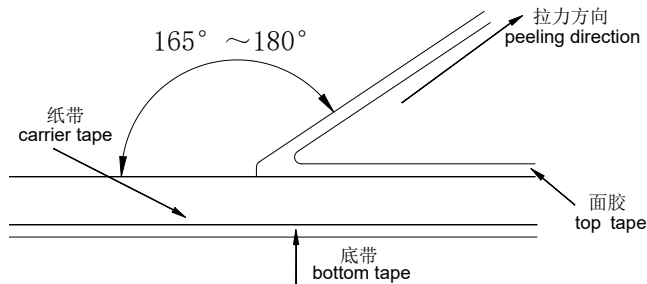
* 编带包装能力 Taping Ability

面带拉力 Top tape peel strength

面带拉力强度为 11g~70g (0.1N~0.7N) , 速度: 300mm/min, 经下列试验后不允许有破裂断带现象。

Peel strength is 11g~70g (0.1N~0.7N),with speed of 300mm/min,and should not have flash and tear after peeling.

测试方法 Test method:



电阻松动自如, 无粘面胶带、底胶带现象。

Resistor is free, no sticking to top tape and bottom tape.

电阻易从纸带中取出, 且晶片孔无机械损伤。

Resistor is easy to take out from carrier tape and chip hole have no mechanical damage.

◆ 包装数量 Packaging Quantity

包装方法Packaging style	7英寸7inch dia.Reel
型号Type	1216
数量Quantity (pcs)	1000

◆ 储存方法 Storage method

温度 5℃~30℃, 相对湿度 30% RH~70% RH. 建议在符合上述储存条件下十二个月内使用。

T: 5℃~30℃, RH: 30%RH~70%RH.The products are suggested to be used within twelve months when received, and the storage condition mentioned above should be followed.

◆ 电流检测电阻阻值代码及标记规则

Description for resistance Value Code and Marking of Current Sensing Thick Film Chip Resistor

* 阻值代码 Resistance Value Code

所有电流检测电阻全尺寸统一采用四位数阻值代码表示。

All resistance value code of current sensing thick film chip resistor used four digits.

例 Example

MSV1216KR001FT

四位数代号表示，如：R001=1mΩ；0M50=0.5mΩ

To use four digits codes represent resistance value,

例 Example R001=1mΩ；0M50=0.5mΩ

* 标记 Marking

*E-24 和 E-96 系列（1216， $\leq \pm 5\%$ ）：采用四位标记代码。

For (1216, $\leq \pm 5\%$), when resistance value belongs to E24 and E96 series, we suggest preferentially use four digits.

标记代码 Mark Code	阻值范围 Resistance Value	示例 Sample
R00×	1mΩ \leq R \leq 3mΩ	R003=3mΩ
×M××	0.1mΩ<R<10mΩ（包含小数点后两位有效数字） (Contains two significant digits after the decimal point.)	0M50=0.5mΩ

*非 IEC 标准系列的电阻标记表示方法：一般以最接近 IEC E24 系列标称阻值的标记表示方法。

For the resistance values which don't belong to IEC serial, use the resistance of IEC serial which is most close to the required resistance of non-IEC serial for replacement.

* 客户对标记有特殊要求时，则按照协商的结果印刷标记。

To get agreement by both party if there special requirement for the marking.

◆ 使用前的注意事项 Precautions Before Use

* 本产品以下特殊环境下应用，性能可能会受到影响：

- 1、在各种类型的液体，包括水、油、化学品、有机溶剂的使用。
- 2、在户外直接暴露在阳光的地方，或在灰尘多的地方使用。
- 3、在产品暴露的地方，有海风或腐蚀性气体，包括氯气、硫化氢、氨气、二氧化硫、二氧化氮。
- 4、在产品暴露于静电或电磁波的地方使用。
- 5、在产生热量的部件、塑料线，或其他易燃物品附近使用。
- 6、在用树脂或其他涂层材料密封产品的情况下使用。
- 7、焊接后使用不洁焊料或使用水或水溶性清洗剂清洗产品。

* Application of the products in a special environment can deteriorate product performance:

- 1、Use in various types of liquid, including water, oils, chemicals, and organic solvents.
- 2、Use outdoors where the products are exposed to direct sunlight, or in dusty places.
- 3、Use in places where the products are exposed to sea winds or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, and NO₂ etc.
- 4、Use in places where the products are exposed to static electricity or electromagnetic waves.
- 5、Use in proximity to heat-producing components, plastic cords, or other flammable items.
- 6、Use involving sealing or coating the products with resin or other coating materials.
- 7、Use involving unclean solder or use of water or water-soluble cleaning agents for cleaning after soldering.

*** 产品使用注意事项**

- 1、避免采用超过正常额定功率的功率，超过额定功率的稳态负载条件下可能会对产品性能和可靠性产生负面影响。
- 2、用镊子拿起产品时要小心，有可能会将保护或电阻体夹碎。
- 3、手动安装产品时，烙铁头勿触碰产品。
- 4、用于车载设备、医疗设备、航空设备以及其他涉及人身安全、或可能引起重大损失的设备上时，请务必事先与我公司联系。这些产品在这类用途中出现故障或失灵可能导致人身事故或严重损坏。

*** Precautions on use of products**

- 1、Avoid applying power exceeding normal rated power, exceeding the power rating under steady-state loading condition may negatively affect product performance and reliability.
- 2、Be careful when pick up the products with tweezers. There may be a care that the overcoat and / or the body can be chipped.
- 3、Soldering tip shall not touch the product when install product manually.
- 4、Contact our sales representatives before you use our products for applications including automotive, medical equipment and aerospace equipment. Malfunction or failure of the products in such applications may cause loss of human life or serious damage.

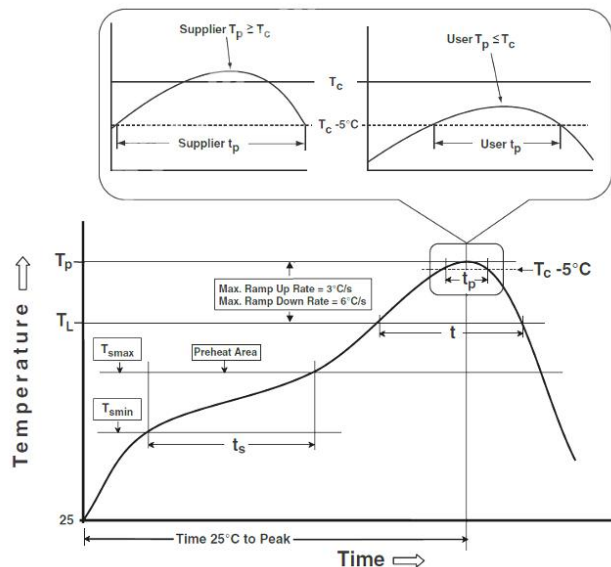
◆ 推荐安装/焊接方法 Recommended installation/welding method

*** 推荐的回流焊曲线 Recommended reflow profile**

- 回流焊要求：器件回流焊要求满足 J-STD-020 无铅回流焊，具体要求如下：

Reflow soldering requirements: The device reflow soldering requirements meet the J-STD-020

lead-free reflow soldering. The specific requirements are as follows:



*升温速率 (Ramp-up rate (TL-TP)) : >3°C/s

*降温速率 (Ramp-up rate(TP-TL)) : ≤6°C/s

*预热温度 (Preheat/soak) : 150°C -200 °C (TS min to TS max) :60s-120s

*液相线217°C以上时间 Time above 217°C of liquid phase (TL) : 60s-150s.

*T_c最高温度 Maximum temperature of T_c: 260°C

*最长焊接时间 Maximum welding time: 8min max.

*峰值温度T_p=T_c-5°C以内的时间: 30秒 T_p Time within the range where peak temperature T_p = T_c - 5°C: 30s

*产品至少可承受回流焊次数: 3次 Minimum number of reflow soldering cycles the product can withstand: 3 times

* 推荐的焊膏类型 Recommended solder alloy: 96.5Sn-3.0Ag-0.5Cu

◆修订履历 Revision History

版本 Version	日期Date	修订内容Revision Content	修订人Reviser
I 1.0	2026-05-29	-优化产品示意图 -Optimize the product schematic diagram -新增 0.3mΩ 相关参数及优化其他阻值的电性能参数。 -Add parameters related to 0.3mΩ and optimize the electrical performance parameters of other resistance values -附录：修改焊接条件。 - Appendix: Modification of Soldering Conditions	敖桂荣 Guirong Ao
I 0	2025-11-24	--原版The original version	敖桂荣 Guirong Ao

注: 上述所提供之内容为产品规格说明。在产品未变更时, 风华保有修改此内容不另行通知之所有权利, 任何产品变更将会以 PCN 通知客户。

Remark: Information provided above is intended to indicate product specifications only. Fenghua reserves all the rights for revising this content without further notification, as long as products are unchanged. Any product change will be announced by PCN.