

■车规电流检测合金电阻器(AMI 系列)

Current Sensor Metal Resistor Automotive Grade (AMI-Series)

◆ 特点 Features

- * 符合 AEC-Q200 汽车标准条款
Compliant with AEC-Q200 standard
- * 最高功率可达 1W
High power up to 1W
- * 最低 TCR 为 $\pm 100\text{PPM}/^\circ\text{C}$
Lowest TCR $\pm 100\text{PPM}/^\circ\text{C}$
- * 适于作电流探测用电阻器如电源电路等
Current detecting resistors for power supply etc
- * 符合 ROHS 指令要求
Compliant with RoHS directive



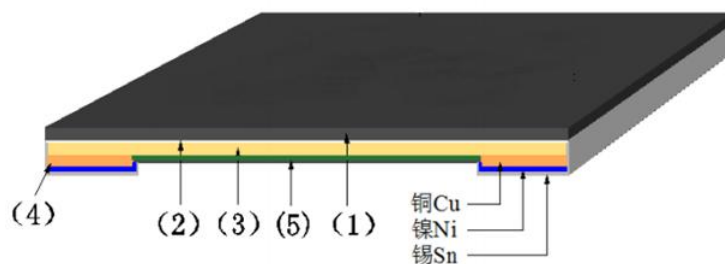
◆应用领域 Application

锂电模块、电源转换器、手机快速充电器、便携式设备、平板电脑、汽车电子等。

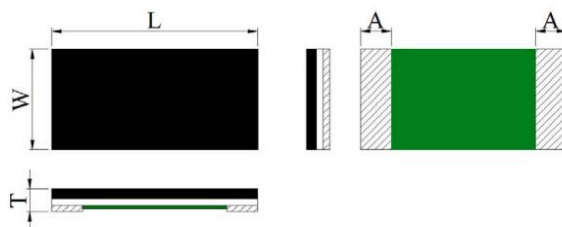
Lithium battery module、Power Converter、Cell phone quick charger、Portable equipment、Table PC、Automotive Electronics etc.

◆型号表示方法 Part Number

产品代号 Product Code		额定功率代号 Power Rating Code		型号代号 Type Code		电阻温度系数代号 T.C.R Code			电阻值代号 Resistance Value Code		电阻值误差精度 代号 Resistance Tolerance Code		包装方式代号 Packing Style Code	
AMI		J		06		K			R002		F		T	
车规电流检测合金电阻器 Current Sensor Metal Resistor Automotive Grade (AMI-Series)		代号 Code	额定功率系列 Power rating	代号 Code	型号 Type	型号 Type	代号 Code	T.C.R PPM/ °C	单位 Ω ，小数点用 R 表示；单位 m Ω ，小数点用 M 表示； Units: Ω Decimal point should be expressed by "R" ; Units: m Ω Decimal point should be expressed by 'M' 例如 Example: R001=0.001 Ω 1M50=1.5m Ω R010=0.010 Ω		代号 Code	误差精度 Toleranc e	代号 Code	包装方法 Packing Style
		F	1/4W	03	0603	0603 0805 1206	K	± 100			F	$\pm 1\%$	T	编带包装 Tape & Reel
		G	1/2W	05	0805		J	± 150						
		J	1W	06	1206		W	± 200						

◆产品结构 Construction


- * 基板 / Substrate: 聚酰亚胺 / PI
- * 粘著胶层/Adhesive: 环氧树脂 / epoxy
- * 电阻本体 / Resistive element: 铜合金 / Cu - alloy
- * 端电极 / Terminal electrode: 锡、镍、铜 / Sn、Ni、Cu
- * 保护防焊层 / Protective coating: 防火级环氧树脂(绿色) /
Flame-retardant epoxy, meets UL - 94-V0 requirements (green)

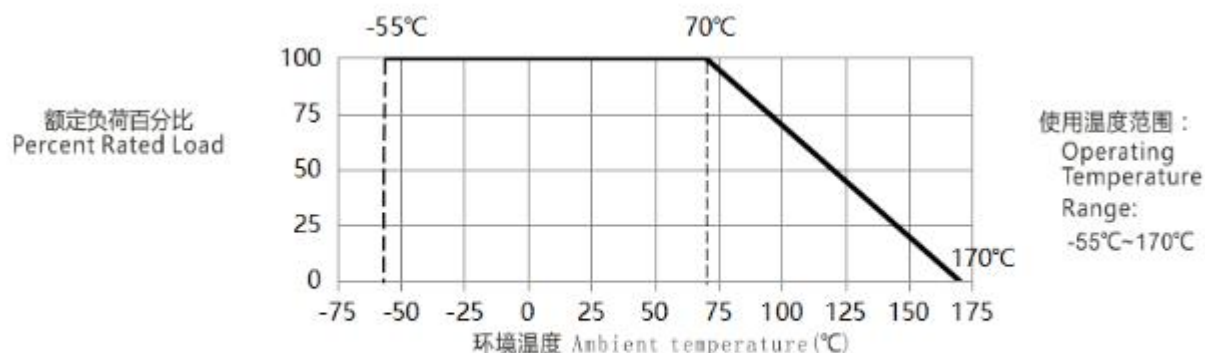
◆规格尺寸 Dimensions


型号 Type	阻值代号 Resistance Value Code	阻值 (mΩ)	L (mm)	W (mm)	T (mm)	A (mm)
0603	R002-R003	2-3	1.60±0.20	0.80±0.20	0.40±0.15	0.45±0.20
0805	R001	1	2.00±0.20	1.25±0.20	0.50±0.15	0.65±0.20
	1M50-R002	1.5-2	2.00±0.20	1.25±0.20	0.40±0.15	0.65±0.20
	R003-R005	3-5				0.40±0.20
1206	R001	1	3.20±0.25	1.60±0.25	0.55±0.15	1.10±0.25
	R002	2			0.40±0.15	
	R003-R004	3-4				0.90±0.25
	R005	5				0.60±0.25

注：产品采用符合高频应用的材料（如锰铜、卡玛），该材料的特点是寄生电感值低。

◆产品特性曲线图 Product Characteristic Curve

*负 荷 下 降 曲 线 Derating curve



注：当电阻使用的环境温度超过70°C时，其额定负荷(额定功率)按上述曲线下降。

Note: For resistors operated in ambient over 70°C, rated load (rated power) shall be derated in accordance with the above figure.

◆电性能参数 Electrical Performance Parameters

型号 Type	阻值范围 Resistance Range (mΩ)	70°C下额定功率 Rating Power at 70°C (W)	元件极限电流 Limiting Element Current (A)	最大过负荷电流 Max.Over load Current (A)
0603	2	1/4	11.2	25.0
	3	1/4、1/2	12.9	28.9
0805	1-2	1/2、1	31.6	70.7
	3-5	1/2	12.9	28.9
1206	1-5	1	31.6	70.7
注 Note	1、电流为直流或交流有效值。 Current of DC or AC RMS value. 2、 $I = \sqrt{P/R}$ 或元件极限电流两者中的较小值。 $I = \sqrt{P/R}$ or Limiting element current whichever is lower. I: 额定电流 Rated current (A) P: 额定功率 Rated power (W) R: 标称阻值 Normal resistance (Ω)			

◆电性能参数 Electrical Performance Parameters

型号 Type	阻值范围 Resistance Range (mΩ)	电阻温度系数 T. C. R (PPM/°C)
		标称阻值允许偏差 Resistance Tolerance
		±1%
0603	2	±200
	3	±100
0805	1	±200
	1.5-5	±100
1206	1	±150
	2-5	±100

◆可靠性测试方法 Reliability Test Method

项目 Item	标准 Specifications	测试方法 Test Methods
可焊性 Solderability	无可见损伤 No mechanical damage 可焊面积≥95% 95% Cover Min	AEC-Q200 Test 18/ IEC 60115-1 11.1 245℃±5℃锡槽，保持 3s±0.3s。 Lead-free solder bath at 245℃±5℃ for 3s±0.3s.
耐焊接热 Resistance to Soldering Heat	无可见损伤 No mechanical damage $\Delta R \leq \pm 1.0\%R$	AEC-Q200 Test 15/ MIL-STD-202 Method 210 270℃±5℃锡槽，保持 10s±1s。 Lead-free solder bath at 270℃±5℃ for 10s±1s.
基板弯曲试验 Substrate Bending Test	无可见损伤 No mechanical damage $\Delta R \leq \pm 1.0\%R$	AEC-Q200 Test 21/ AEC-Q200-005 弯曲距离(Bending distance): 3mm。 保持时间(Duration): 60s±5s.
电阻温度系数 T.C.R	在规定值内 Within specified T.C.R	AEC-Q200 Test 19/ IEC 60115-1 6.2 +20℃/+125℃/+20℃
温度快速变化 Rapid Change of Temperature	无可见损伤 No mechanical damage $\Delta R \leq \pm 1.0\%R$	AEC-Q200 Test 4/ JESD22 Method JA-104 -55℃(30 分钟)~常温(≤1 分钟)~155℃(30 分钟)，1000 个循环。 -55℃(30min)~normal temperature(≤1min)~155℃(30min)，1000 cycles.
短时间过载 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 5 秒。 5×Rated Power, for 5 s.
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℃，湿度 85%RH，1000 小时，施加 10%额定功率或元件极限电流（取较小值），通 1.5 小时/断 0.5 小时。 85℃/85%RH. 1000 hours, Apply 10% of operating power or limiting element current whichever is lower for 1.5h ON/0.5h OFF.
工作寿命 Operational Life	无可见损伤 No mechanical damage $\Delta R \leq \pm 1.0\%R$	125℃±2℃，1000 小时，降额电流，通 1.5 小时/断 0.5 小时。 125℃±2℃,1000h,derated current for 1.5h ON/0.5h OFF.
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℃±2℃，不通电。 1000 hrs. @ T=170℃±2℃. Unpowered.
绝缘电阻 Insulation Resistance	1000MΩ Min	IEC 60115-1 4.6 在电极与基片间施加 100V±15V 直流电压，保持 1 分钟，然后测绝缘电阻值。 Apply DC 100V±15V between substrate and terminations for 1min, then check insulation resistance.
耐电压 Voltage Proof	无击穿或飞弧 No breakdown or flashover	IEC 60115-1 12.1 在电极与基片间以大约 100V/s 的速率施加有效值为最大过负荷电压的交流电压 (0603:150V, 0805:300V, 1206:400V)，保持 60s±5s。 Apply max. overload voltage of AC RMS at a rate of approximately 100V/s between substrate and terminations for 60s±5s.

耐溶剂性 Resistance to Solvents	标志清晰, 无可见损伤 Clearly marked, No mechanical damage	AEC-Q200 Test 12/ MIL-STD-202 Method 215 浸在三种溶剂 3min 后擦拭 10 次, 浸、刷共 3 回, 用水洗清洗剂进行清洗, 并在室温下对整个表面进行通风干燥。 Immersed in three solvents after 3min immersion, brush wipe 10 times, a total of 3 times, washing with washing and cleaning agent, room temperature on the surface of the ventilation drying.
机械冲击 Mechanical Shock	无可见损伤 No mechanical damage $\Delta R \leq \pm 1.0\%R$	AEC-Q200 Test 13/ MIL-STD-202 Method 213 正半弦波, 峰值加速度: 100g's, 脉冲持续时间: 6ms, 三轴六向各 3 次, 共 18 次。 Positive half wave, peak acceleration: 100g's, pulse duration: 6ms, three axis six to each 3 times, a total of 18 times.
振动 Vibration	无可见损伤 No mechanical damage $\Delta R \leq \pm 1.0\%R$	AEC-Q200 Test 14/ MIL-STD- 202 Method 204 频率: 10Hz~2000Hz, 加速度: 5 g's, 一个循环 20min, X、Y、Z 三个方向每个方向 12 个循环, 共 36 个循环。 Frequency: 10Hz ~ 2000Hz, acceleration: 5 g's, a loop 20min, X, Y, Z three directions, each direction 12 cycles, 36 cycles.
热冲击 Thermal Shock	无可见损伤 No mechanical damage $\Delta R \leq \pm 1.0\%R$	AEC-Q200 Test 16/ MIL-STD-202 Method 107 -55℃(15 分钟)~常温(≤20 秒)~155℃(15 分钟), 300 个循环。 -55℃(15min)~normal temperature(≤20s)~155℃(15min) , 300 cycles.
可燃性 Flammability	不完全燃尽, 薄垫纸应不被引燃, 松木板应不被烤焦炭化 No ignition of the tissue paper or scorching or the pinewood board	AEC-Q200 Test 20 / UL-94 V-0 或 V-1 可接受。不需要电气测试 V-0 or V-1 are acceptable. Electrical test not required.
端子强度 Terminal Strength	无可见损伤 No mechanical damage $\Delta R \leq \pm 1.0\%R$	AEC-Q200 Test 22/ AEC-Q200-006 施加力: 17.7N, 保持 60s±1s。 Applying force 17.7N for 60s±1s.
抗硫化性能 Sulfuration- Resistant	无可见损伤 No mechanical damage $\Delta R \leq \pm 5.0\%R$	油浴, 恒温: 105℃±3℃, 放置时间: 500 小时。 Soaked in industrial oil with sulfur substance contained 105℃±3℃ 500h.
静电放电 ESD	无可见损伤 No mechanical damage $\Delta R \leq \pm 1.0\%R$	人体模型, 两次放电, 正、负极各一次。 Human Body Model, two discharges, positive and negative poles for one time respectively. 静电电压: 2KV Static discharges voltage: 2KV

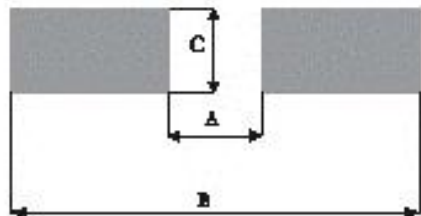
◆包 装 Packaging

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

附录 Appendix I

■ 推荐焊盘尺寸 Recommend Solder Pad Size

* 片式固定电阻器 Chip fixed resistor



单位 unit: mm

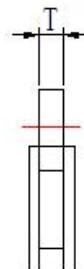
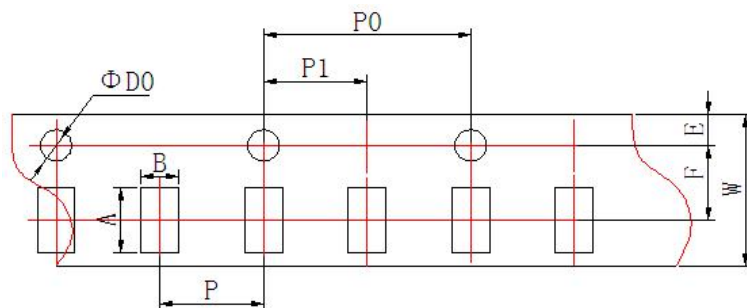
产品系列	型号 Type	阻值范围 (mΩ)	A	B	C
电流检测合金电阻 及车规电流检测合金电阻	0402	5	0.35	1.21	0.60
	0603	2~3	0.61	2.61	1.00
	0805	1 ~ 2	0.50	3.20	1.40
		3 ~ 5	0.80		
	1206	1 ~ 4	0.80	4.40	1.80
		5	1.80		

■ 包装 Packaging

◆ 纸带编带 Paper Taping

* 适用于 0402 :

For 0402 :



0402

单位 unit: mm

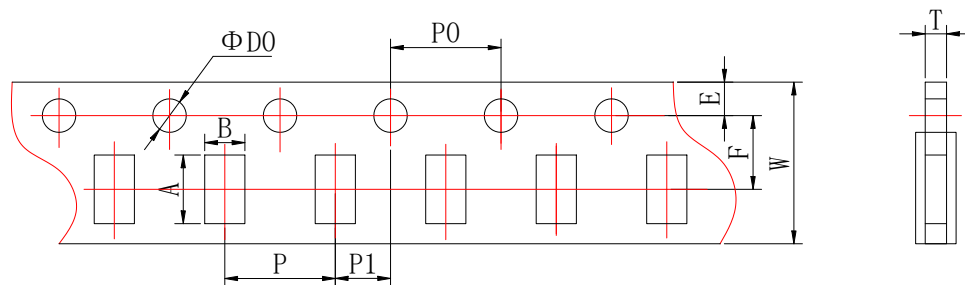
型号 Type	A	B	W	F	E
0402	1.20±0.10	0.70±0.10	8.00±0.20	3.50±0.05	1.75±0.10

单位 unit: mm

型号 Type	P	P0	P1	ΦD0	T
0402	2.00±0.05	4.00±0.10	2.00±0.05	1.50±0.10	0.42±0.05

* 适用于 0603、0805、1206:

For 0603、0805、1206:



单位 unit: mm

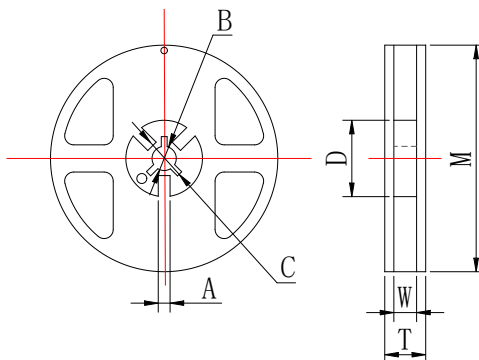
型号 Type	A	B	W	F	E
0603	1.85±0.10	1.10±0.10	8.00±0.20	3.50±0.05	1.75±0.10
0805	2.35±0.10	1.65±0.10	8.00±0.20	3.50±0.05	1.75±0.10
1206	3.50±0.20	1.90±0.20	8.00±0.20	3.50±0.05	1.75±0.10

单位 unit: mm

型号 Type	P	P0	P1	ΦD0	T
					MI 合金电阻及 AMI 车规合金电阻
0603	4.00±0.10	4.00±0.10	2.00±0.05	1.50±0.10	0.60±0.10
0805	4.00±0.10	4.00±0.10	2.00±0.05	1.50±0.10	0.75±0.10
1206	4.00±0.10	4.00±0.10	2.00±0.05	1.50±0.10	0.75±0.10

◆卷盘尺寸

Reel Dimension



Unit: mm

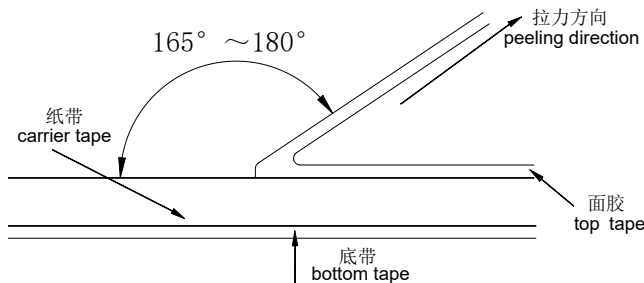
型号 Type	M	W	T	A	B	C	D
0402、0603、0805、1206	178±2.0	9.5±1.0	12.5±1.5	2.0±0.5	13.0±0.5	21.0±0.5	58.0±2.0

◆ 编带包装能力 Taping Ability

*面带拉力 Top tape peel strength

面带拉力强度未 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	编带 Tape & reel	
型号 Type	0402	0603、0805、1206
数量 Quantity (pcs)	10000	5000

■ 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

所有电流检测电阻包括 0402、0603、0805、1206、1210、2010、2512 统一采用四位数阻值代码表示。

All resistance value code of current sensing thick film chip resistor, including 0402、0603、0805、1206、1210 2010、2512 size used four digits.

例 Example

MIF03WR002FT

四位数字代号表示, 如: R002=2mΩ; 0M50=0.5mΩ

To use four digits codes represent resistance value,

例 Example R002=2mΩ; 0M50=0.5mΩ

◆ 标记 Marking

*MI 系列及 AMI 系列合金产品 1206 及以下规格不印刷标记

There is no mark on the glass side.

*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 the customers have special requirements for the marking.

■片式电阻器使用说明 Chip Resistor Instructions For Use

◆ 本产品在以下特殊环境下应用，性能可能会受到影响：

*在各种类型的液体，包括水、油、化学品、有机溶剂的使用。

*在户外直接暴露在阳光的地方，或在灰尘多的地方使用。

*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。

*在产品暴露于静电或电磁波的地方使用。

*在产生热量的部件、塑料线，或其他易燃物品附近使用。

*在用树脂或其他涂层材料密封产品的情况下使用。

*焊接后使用不洁焊料或使用水或水溶性清洗剂清洗产品。

*片状电阻器的基材是氧化铝。由于和安装基板的热膨胀系数不同，在反复施加提供热循环等热应力时，接合部的焊锡（焊锡部）有时会发生裂纹。如果环境温度反复发生很大的变动，并且载荷反复进行 ON/OFF，则需要注意龟裂的发生。因热应力而发生的龟裂，取决于所安装的焊盘的大小、焊锡量、安装基板的散热性等，因此在环境温度有很大的变化或者载荷 NO/OFF 的条件下使用时，请充分注意以进行设计。

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

*Use in various types of liquid, including water, oils, chemicals, and organic solvents.

*Use outdoors where the products are exposed to direct sunlight, or in dusty places.

*Use in places where the products are exposed to sea winds or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, and NO₂.

*Use in places where the products are exposed to static electricity or electromagnetic waves.

*Use in proximity to heat-producing components, plastic cords, or other flammable items.

*Use involving sealing or coating the products with resin or other coating materials.

*Use involving unclean solder or use of water or water-soluble cleaning agents for cleaning after soldering.

*The substrate of chip resistors is alumina. Cracks may occur at the connection of solder (solder fillet portion) due to the difference of the coefficient of thermal expansion from a mounting board when heat stresses like heat cycle, etc. are repeatedly given to them. Care should be taken to the occurrence of the cracks when the change in ambient temperature or ON/OFF of load is repeated. The occurrence of the crack by heat stress may be influenced by the size of a pad, solder volume, heat radiation of mounting board etc., so please pay careful attention to designing when a big change in ambient temperature and conditions for use like ON/OFF of load can be assumed.

◆ 储存方法 Storage Conditions

* 温度 5℃~30℃，相对湿度 30%RH~70%RH。自出货日起在符合上述储存条件质保 24 个月，建议在 12 个月内使用。

T: 5℃~30℃, RH: 30%RH~70%RH. The guarantee period is 24 months from the date of shipment in accordance with the above storage conditions. It is recommended to use within 12 months.

◆ 产品使用注意事项

*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。

*用镊子拿起产品时要小心，有可能会将保护或电阻体夹碎。

*手动安装产品时，烙铁头勿触碰产品。

*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。

*电阻（厚膜/薄膜）的 MSL（潮湿敏感度）定级是：I 级。

◆Precautions on use of products

*Avoid applying power exceeding normal rated power, exceeding the power rating under steady-state loading condition may negatively affect product performance and reliability.

*Be careful when pick up the products with tweezers. There may be a care that the overcoat and / or the body can be chipped.

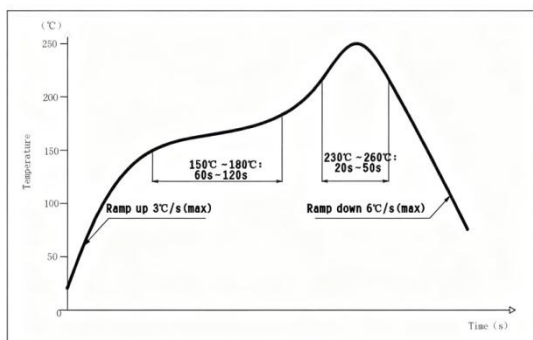
*Soldering tip shall not touch the product when install product manually.

*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.

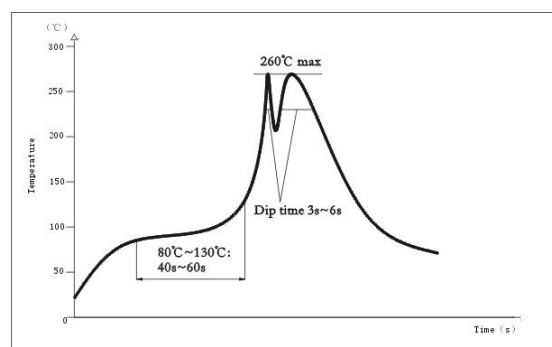
*The MSL of chip resistor (thick film/thin film) : Level I.

◆ 焊接 Soldering

* 推荐的回流焊曲线 Recommended Reflow Profile



* 推荐的波峰焊曲线 Recommended Wave Solder Profile



* 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 Change Description	修订确认 Checked by
I 2.0	2026-01-07	-增加 0603 系列产品参数。 Add the parameters of 0603 -可靠性试验标准条款号更新。 The terms and conditions of the reliability test standard have been updated. -附录：修改回流焊曲线和波峰焊曲线。 Appendix:Modify the requirements for the reflow soldering profile and the wave solder profile.	梁晋荣 Jinrong Liang
V1.0	2024-12-06	--原版。 The first version of this specification	冯伟键 Weijian Feng

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.