

ELECTRONIC COMPONENTS CATALOGUE



<http://www.mmc.co.jp/adv/dev/chinese/index.html>

序言

Introduction

- 本资料中记载的应用电路可充分发挥产品特点 and 性能，且正确可靠。但是，对因使用此类电路而产生的电路方面和工业所有权方面的各种问题，本公司概不负责。此外，因产品改进的需要，产品规格可能在未经预告的情况下发生变更。
 - 产品目录中的记载值仅可用作参考，使用时请参见产品规格书和批准图。
 - 本产品目录中所述的产品用途仅限于一般民用设备。
 - 医疗、宇航、核电等设备中使用的电子元件，与一般民用设备相比，需要更高的可靠性，因为这些设备一旦发生故障，可能会导致人身伤害和巨大的社会损失。因此在准备用于此类用途或产品目录以外的用途时，请务必事先垂询本公司营业部或各分公司。
 - 对于电子元件，尤其是在表面组装的元件，因使用的电路、组装方法及材料、环境条件的不同，其可靠性可能会受到很大的影响。因此，准备在特殊的电路、组装方法及材料、特殊的环境下使用时，请务必事先垂询本公司营业部或各分公司。
 - RoHS 是欧盟（EU）关于在电子、电器中限制使用特定有害物质的指令。
 -  表示 RoHS 指令修订版（2011/65/EU、(EU) 2015/863）的 10 种对象物质（Pb、Cd、Cr6+、Mn、PBB、PBDE、DEHP、BBP、DBP、DIBP）符合规定。
 - REACH 是有关登记、评价、认可及限制化学物质的规则。
 -  表示欧洲化学品管理局（ECHA）的 REACH 法规附录 XIV 中记载的高度关注物质（SVHC）的认可对象物质（到 2021 年 3 月、第 24 次候选物质为止（全部 211 项物质））符合法规。
 - Automotive Electronics Council（AEC）是由大型汽车制造商和电子零部件制造商组成的车载电子零部件可靠性规格化的业界团体。该 AEC 规格是车载电子零部件可靠性的事实上的业界标准规格，在欧美作为面向车载电子零件的规格被广泛采用。
 -  表示 AEC-Q200 对应的评价测试条件的全部或部分已实施完毕。订购时，请参见各产品的产品规格书。
- 本公司现在正在扩充对象产品，关于各产品的详细规格、具体评价测试结果等，请向本公司咨询。

- 本产品目录中记载的内容为 2021 年 12 月 时的情况。
- 未经许可，禁止翻印。

- We are confident that the practical circuit configurations and examples listed in this document will ensure the maximum benefit from the characteristics and performance feature of our products and that these application examples are accurate and reliable. However, we cannot accept any liability for any problems in connection with industrial property rights and concerning any difficulties arising in the use of these circuits. It should also be noted that as part of our ongoing policy of product improvement, the specifications given herein may be changed or modified at anytime without prior notice.
- Values mentioned in the catalog are reference purpose only. Please request specifications for the part which you plan to use.
- Parts shown in the catalog are meant for general commercial products.
- Electronic components used in equipment that can have a serious effect on human life or society, such as medical equipment, equipment for use in space, nuclear related equipment, etc. requires higher reliability parts than those found in general commercial electronics. For these types of applications or for other applications not mentioned in the catalog, please contact our sales department or branch office.
- For electronic components, and especially for surface mount parts, reliability can be affected by the circuit, mounting method and material, as well as the environmental conditions. For this reason, please contact the sales department or branch office if you plan on manufacturing a special circuit, use special mounting methods and materials, or if the equipment will be used in an unusual environment.
- RoHS is the EU directive of the use of certain hazardous substances in electrical and electronic equipment.
-  indicates that the target 10 substances (Pb,Cd,Cr6+,Mn,PBB,PBDE,DEHP,BBP,DBP,DIBP) comply with the RoHS Directive 2011/65/EU.
- REACH is the regulations on registration, evaluation, approval and restriction of chemical.
-  indicates that it conforms to a regulation of substances of very high concern (SVHC) approved by the European Chemicals Agency (ECHA) in Annex XIV of the REACH Regulation (as of March 2021, up to the 24th candidate substance (211 substances in total)).
- Automotive Electronics Council (AEC) is an industry group established by leading automotive and electronic component manufacturers. Its intent is to standardize the reliability and accreditation criteria for automotive electronic components. Today, AEC's standard is widely adopted as the de facto industry standard in Europe and the United States.
-  indicates pass the all or part of the test conditions. When ordering, please exchange delivery specifications for each product.

We are currently expanding the scope of AEC-Q200 compliant products. If you are interested in the detailed specifications, test results or our future AEC-Q200 compliant products, please contact us.

- The details given in the catalog are valid as of Dec. 2021.
- All rights reserved.

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电源线用

CDA70〔贴片式〕
FA44
FA55
新产品 DA53
DSA
新产品 EAZR
DSahr/NR/ZR

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DE37
DSS/ 高电压 DSS
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FA55
NEW DA53
DSA
NEW EAZR
DSahr/NR/ZR

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For Communication Lines

DE37
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DSP/High Voltage DSP
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For switch board

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NTC 热敏电阻

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板载式热敏电阻
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板载式热敏电阻系列

吸用于进气温度、用于 ECU
新产品 用于水温、油温、进气温度、ECU、EGR、汽车空调(蒸发器、外界气温)、发动机
用于汽车空调 (车内温度)、ECU
用于 ECU· 电池、ECU、汽车空调 (车内温度)
用于电池

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热敏传感器

汽车

用于表面温度检测
高速应答表面温度传感器、用于变频器、DCDC 变流器、充电器
油温、水温传感器
进气温度传感器
用于汽车空调 (蒸发器)

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白色家电

用于空调气温
用于空调热交换器
用于空调排气管
用于开水器
用于热水器
用于洗衣机
用于智能座便
用于电冰箱

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NTC THERMISTORS

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Surface Mountable Thermistor (SURFACE MOUNTABLE)

Chip type thermistors series
On board thermistor
NEW Flake type thermistor

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On board thermistors series

For Air Temperature/For ECU
NEW For Water Temp / Oil Temp, Air Temp, ECU, EGR car air conditioner (Evaporator, Ambient), motor
For car air conditioner (Room Temp), ECU
For ECU / For battery cells, ECU, car air conditioner (room Temp)
For Battery cells

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Thermistor sensors

Automotive products

For Measuring surface Temp
Quick Response Surface Sensor, For Inverter,DCDC converter,Charger
Oil/coolant Temperature sensor
Intake Air Temperature sensor(IAT)
For car air conditioner (Evaporator)

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Home Appliance

For Air Temp of Air conditioner
For Heat Exchanger of Air conditioner
For Delivery pipe of Air conditioner
For Instant boiler
For Hot boiler
For Washing machine
For Bidet
For Refrigerator

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雷击浪涌测试服务

Surge Test Service



三菱材料为客户的浪涌对策提供解决方案。

- 处于开发过程中的设备无法通过UL标准等。
- 市场上的设备被感应雷击所破坏，需要想出对策。

以上种种，是否曾困扰过您？

对电子设备采取浪涌对策时，因开发模式/产品等造成各种不同条件，因此实际进行浪涌测试进行验证是有效的方法。

在三菱材料陶瓷工厂，本公司的技术人员会同客户一起，对客户带来的设备进行浪涌测试，提供浪涌对策的解决方案。

客户不能来现场时，由本公司技术人员实施验证。测试完成后，在迅速返还设备的同时，以书面报告的形式提出对策方法等。

在本公司的陶瓷工厂，可以根据静电、通信线路、电源线的各种规格（IEC61000-4-2、IEC61000-4-5、JEC、JIS、UL、ITU-T等）进行浪涌测试。

如有疑问可与本公司销售代表联系。

Mitsubishi Materials is pleased to offer customers surge absorber counter-measure solutions.

Have you ever experienced the following?

- During development, the product cannot pass UL inspection.
- The product has been damaged by lightning and you'd like to take preventative measures.

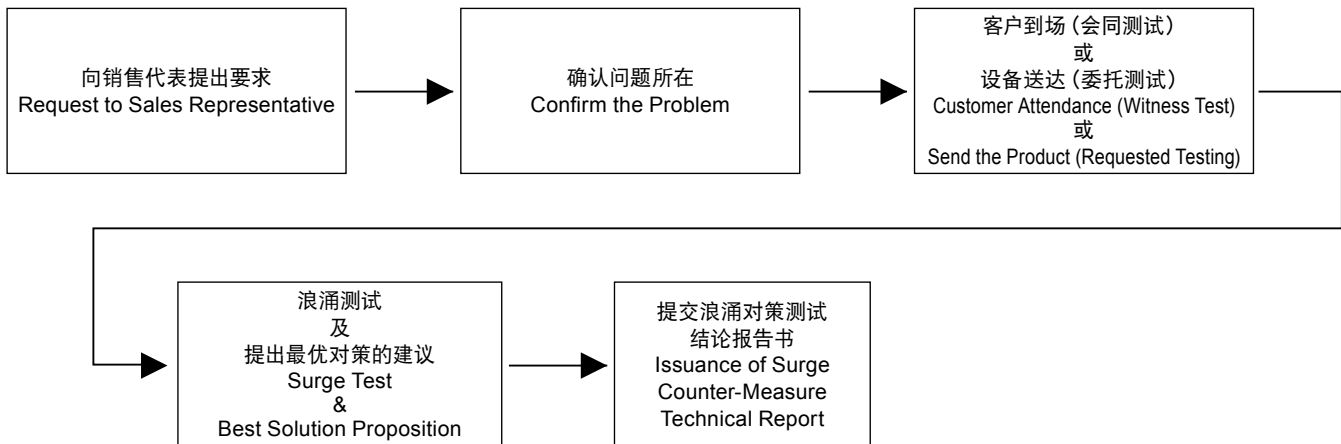
Because conditions differ depending on the development model/product variation, it is beneficial to perform actual surge tests.

At the Mitsubishi Materials Ceramics Factory, our engineers, in attendance with the customer, can perform surge tests on a product and offer surge counter-measure solutions. If the customer is unavailable or unable to attend, there is also an option to have the product sent and tested by our engineers alone. Once the test is complete, we can quickly return the product along with a detailed report on the counter-measure solutions.

At our Ceramics factory, it is possible to base the testing on a variety of standards, including IEC61000-4-2, IEC61000-4-5, JEC, JIS, UL, ITU-T and more.

Please contact your sales representative with any problems you may have.

■ 雷击浪涌测试服务流程 Surge Test Service Flowparts



■ 联系方式 Inquiry

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雷击浪涌测试服务（埼玉县秩父郡横濑町）
Surge Test Service (YOKOZE SAITAMA)

对应规格一览 Correspondence standards

- IEC61000-4-5
- IEC61000-4-4
- IEC61000-4-2
- IEC61643-311

- ISO10605
- JASO D001
- JASO D010

- JEC 0202
- JEC 0103

测试项目 Test	No.	参考规格 Reference Standard	标准的名称 Standard Detail	波形 Wave
雷击浪涌测试 Lightning Surge Test	1	IEC61000-4-5	电磁兼容性(EMC)-第4-5部: 测试技术及计量技术-浪涌耐受性测试 Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test	● 合波形 Combination Wave 1.2/50 μ s $\sim$ 15kV, 8/20 μ s $\sim$ 7.5kA 10/700 μ s $\sim$ 15kV
	2	JEC 0202	脉冲电压、电流常规测试	● 电压波形 Voltage Wave 1.2/50 μ s $\sim$ 12kV ● 电流波形 Electric Current Wave 8/20 μ s $\sim$ 40kA
	3	ITU-T K.20	Resistibility of telecommunication equipment installed in a telecommunications centre to overvoltages and overcurrents	● 电压波形 Voltage Wave 10/700 μ s $\sim$ 15kV
	4	ITU-T K.21	Resistibility of telecommunication equipment installed in customer premises to overvoltages and overcurrents	
	5	IEC61643-311	低电压浪涌保护装置的元件-第311部: 气体放电管(GDT)的规格 Components for low-voltage surge protective devices - Part 311: Specification for gas discharge tubes (GDT)	● 电压波形 Electric Current Wave 10/1,000 μ s 1A/5A/10A/50A/100A/200A
静电测试 Static Electricity Test	6	IEC61000-4-2	电磁兼容性(EMC)-第4-2部: 测试及计量技术-静电放电耐受性测试 Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test	● ESD波形 ESD Wave 最大外加电压: $\sim$ 30kV Maximum Voltage Applied: $\sim$ 30kV C单元: 100p $\sim$ 500pF C Unit: 100p $\sim$ 500pF 放电电阻: 150 Ω $\sim$ 10k Ω Arc Resistance: 150 Ω $\sim$ 10k Ω
	7	ISO10605	道路机动车辆-由静电放电造成的电气干扰的测试方法 Road vehicles. Test methods for electrical disturbances from electrostatic discharge (British Standard)	
	8	JASO D001	汽车用电子设备的环境测试方法通则 General rules of environmental testing methods for automotive electronic equipment	
	9	JASO D010	汽车及汽车部件-由静电放电造成的电气干扰的测试方法 Road vehicles and automotive Parts - Electrical disturbances from electrostatic discharges	
噪音模拟器 Noise Simulation	10	JEC 0103	低压控制电路测试电压标准	● 脉冲电压波形 Pulse Voltage Wave 最大外加电压: 4kV Maximum Voltage Applied: 4kV 脉冲宽度: 50ns $\sim$ 1,000ns Pulse Amplitude: 50ns $\sim$ 1,000ns 周期: 10ms $\sim$ 999ms Cycle: 10ms $\sim$ 999ms
快速瞬变脉冲群测试 Fast Transient Vast Test	11	IEC61000-4-4	电磁兼容性(EMC)-第4-4部: 测试及计量 快速瞬变脉冲群测试(高速过渡现象)/脉冲群耐受性测试 Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test	● 脉冲群耐受性测试 Vast Immunity Test 1) 脉冲反复: 2.5kHz $\sim$ 5KHz Pulse Repetition: 2.5kHz $\sim$ 5KHz 脉冲群持续时间: 8ms $\sim$ 30ms Vast Duration: 8ms $\sim$ 30ms 脉冲群反复: 150ms $\sim$ 600ms Vast Repetition: 150ms $\sim$ 600ms 2) 脉冲反复: 0KHz Vast Repetition: 10KHz 脉冲群持续时间: 8ms $\sim$ 65ms Vast Duration: 8ms $\sim$ 65ms 脉冲群重复: 300ms $\sim$ 600ms Vast Repetition: 300ms $\sim$ 600ms

※ 关于上述规格以外的情况, 敬请垂询。
Please inquire for tests other than those above.

浪涌吸收器

Surge Absorber Series

产品系列

Products Line up

	For Power Line								
									
	CDA70	FA44	FA55	DA53	DSA	EZR	DSHR	DSNR	DSZR
Page	21	23	25	27	29	30	31	32	33
浪涌耐量 / A Surge current capacity	2,000	2,000	2,500 / 3 次 3,000 / 1 次 2,500 / 3times 3,000 / 1time	3,000	ϕ 0.4:1,500 ϕ 0.5:2,000	$I_{max}=5kA$ $I_n=2kA$ $I_{max}=10kA$ $I_n=5kA$	5,000	1,000	1,000
形状 type	Chip type	Lead type				Combination type			
安全标准 Safety standard	UL cUL EN	UL cUL EN	UL cUL EN	UL CSA EN	UL CSA EN	UL cUL	UL	UL EN	UL CSA EN
浪涌标准 Conforms with standard	IEC61000-4-5	IEC61000-4-5	IEC61000-4-5	IEC61000-4-5	IEC61000-4-5	IEC61000-4-5	IEC61000-4-5	IEC61000-4-5	IEC61000-4-5
Vs									
140									
200									
300									
350									
400									
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600									
700									
750									
800									
1,000									
1,100									
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3,000									
3,300									
3,600									
4,000									
4,500									
6,200									
7,500									
7,800									
用途 Applications	SW电源、变频器电源、OA设备及家用电器的电源、太阳能发电专用功率调节器、EV/PHV汽车专用充电器、LED室外照明、UPS Power supplies: switching power, inverter, office and consumer. Photovoltaic power conditioner, electrical and hybrid vehicle charger, high-power and exterior LEDs, and UPS.								

浪涌吸收器

Surge Absorber Series

产品系列

Products Line up

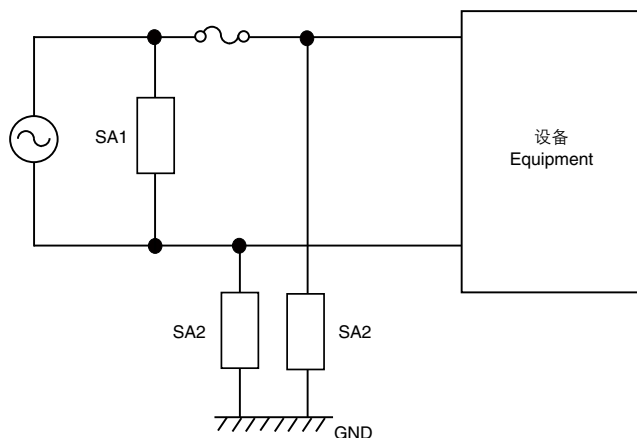
	For Communication Line			For ESD			SPD
							
	DE37	DSS	CSA70	DSP	CSA30	CSA20	LTP
Page	34	36	42	44	48	49	50
浪涌耐量 / A Surge current capacity	1,500	500	2,000	300 ~ 1,000	—	—	20,000
形状 type	Lead type		Chip type	Lead type	Chip type		SPD
安全标准 Safety standard	UL cUL EN	UL CSA EN	UL(497B)	—	—	—	—
浪涌标准 Conforms with standard	ITU-T	ITU-T	ITU-T	IEC61000-4-2	IEC61000-4-2	IEC61000-4-2	—
Vs							
140							
200							
300							
350							
400							
500							
600							
700							
750							
800							
1,000							
1,100							
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3,000							
3,300							
3,600							
4,000							
4,500							
6,200							
7,500							
7,800							
用途 Applications	传真机、调制解调器、VoIP、xDSL、ADSL等 Fax, modem, telephone, VoIP, xDSL, ADSL, and others.			汽车导航仪、汽车音响、汽车天线、娱乐设备等 Car navigation, car audio, automotive antenna, gaming/ amusement machines, and others.			配控制柜、NC机床、火花机、自动装置等 Switch board, NC tooling, arc discharge machining, robots, and others.

1) 需要进行 AC 耐电压试验的电源

Power supply requiring AC withstanding

应用例：SW 电源、变频器电源、OA 设备及家用电器的电源

Application: SW power supply, inverter power supply, power supply of office and home appliance



注) 在 IEC62368-1 中, 作为设备的一次电路的浪涌对策, 要求满足一定条件的 MOV^{※1)} (压敏电阻) 和 GDT^{※2)} 气体放电管串联连接。
IEC62368-1 requires series usage of MOV^{※1)} and GDT^{※2)} for surge protection in the primary circuits of equipment.

1) The MOV complies with the requirements of Annex G.8.

2) The GDT complies with:

*the electric strength test for BASIC INSULATION; and

*the external Clearance and Creepage distance requirements for basic insulation.

■ 推荐部品 Recommended parts

		AC125V	AC250V
正常模式(线之间) SA1 Normal mode(Between L1 and L2)		DSANR-1 DSAZR1-301L	DSANR-3 DSAZR2-501M
共用模式 SA2 (线~GND之间) Common mode (Between L1/L2 and GND)	无要求 Test is not required	DSANR-1, DSAZR1-301L	DSANR-3, DSAZR2-501M
	AC1,000V-1min. AC1,200V-3sec.	DSANR-4, DSAZR1-242M CDA70-272M+压敏电阻 ¹⁾ (MOV) ¹⁾ DA53-272M+压敏电阻 ¹⁾ (MOV) ¹⁾ DSA-242M+压敏电阻 ¹⁾ (MOV) ¹⁾ DE37-272M+压敏电阻 ¹⁾ (MOV) ¹⁾	DSAZR2-242M CDA70-272M+压敏电阻 ²⁾ (MOV) ²⁾ DA53-272M+压敏电阻 ²⁾ (MOV) ²⁾ DSA-242M+压敏电阻 ²⁾ (MOV) ²⁾ DE37-272M+压敏电阻 ²⁾ (MOV) ²⁾
	AC1,500V-1min.	DSANR-5, DSAZR1-302M CDA70-302M+压敏电阻 ¹⁾ (MOV) ¹⁾ DA53-302M+压敏电阻 ¹⁾ (MOV) ¹⁾ DSA-302M+压敏电阻 ¹⁾ (MOV) ¹⁾ DE37-302M+压敏电阻 ¹⁾ (MOV) ¹⁾	DSANR-5, DSAZR2-302M CDA70-302M+压敏电阻 ²⁾ (MOV) ²⁾ DA53-302M+压敏电阻 ²⁾ (MOV) ²⁾ DSA-302M+压敏电阻 ²⁾ (MOV) ²⁾ DE37-302M+压敏电阻 ²⁾ (MOV) ²⁾
	AC1,800V-3sec.	DSANR-6, DSAZR1-362M CDA70-362M+压敏电阻 ¹⁾ (MOV) ¹⁾ DA53-362M+压敏电阻 ¹⁾ (MOV) ¹⁾ DSA-362M+压敏电阻 ¹⁾ (MOV) ¹⁾ DE37-362M+压敏电阻 ¹⁾ (MOV) ¹⁾	DSANR-6A, DSAZR2-362M CDA70-362M+压敏电阻 ²⁾ (MOV) ²⁾ DA53-362M+压敏电阻 ²⁾ (MOV) ²⁾ DSA-362M+压敏电阻 ²⁾ (MOV) ²⁾ DE37-362M+压敏电阻 ²⁾ (MOV) ²⁾
	AC2,000V-1min.	DSANR-10B, DSAZR1-452M DSA-402M+压敏电阻 ¹⁾ (MOV) ¹⁾ DE37-452M+压敏电阻 ¹⁾ (MOV) ¹⁾	DSANR-10B, DSAZR2-452M DSA-402M+压敏电阻 ²⁾ (MOV) ²⁾ DE37-452M+压敏电阻 ²⁾ (MOV) ²⁾

压敏电阻¹⁾: 压敏电阻电压 220V 以上 (UL 认定条件为 270V 以上)压敏电阻²⁾: 压敏电阻电压 470V 以上

* 表中的 + 表示放电管和压敏电阻的串联连接。

MOV¹⁾: Varistor voltage: More than 220V (UL recognized: More than 270V)MOV²⁾: Varistor voltage: More than 470V

"+": electrically connected series by gas discharge tube and varistor

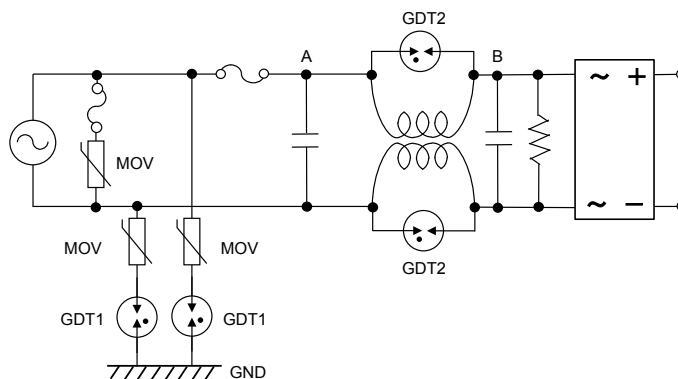
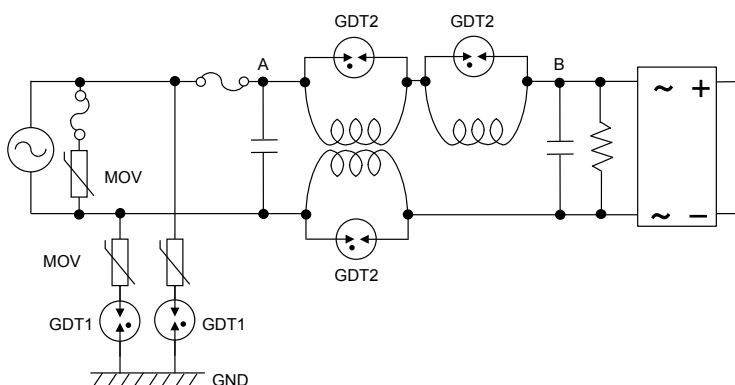
2) 共振措施

如右图浪涌侵入电源线, 电源线与接地间的浪涌措施电路 (A 点) 反应时, 其残余电压会传至后半部分。因滤波器的 LC 共振, 残余电压增幅并有可能破坏后半部分的电路。建议在共模扼制线圈 (GDT2、GDT3) 的前后安装浪涌吸收器以保持电位均衡。

In case surge absorber located between power line to ground; point A in figure, reacts against the surge, residual voltage is transmitted to the latter part of the circuit. Some part of the circuit is destroyed because of amplified residual voltage by LC resonance of a noise filter and/or a coil. Potential equalization before and behind the common mode coil by a surge absorber; GDT2, is recommended as a measure.

Carrying out potential equalization between the terminals of a common mode coil and the both ends of a coil with a surge absorber (GDT2, GDT3) is recommended.

Resonance measure

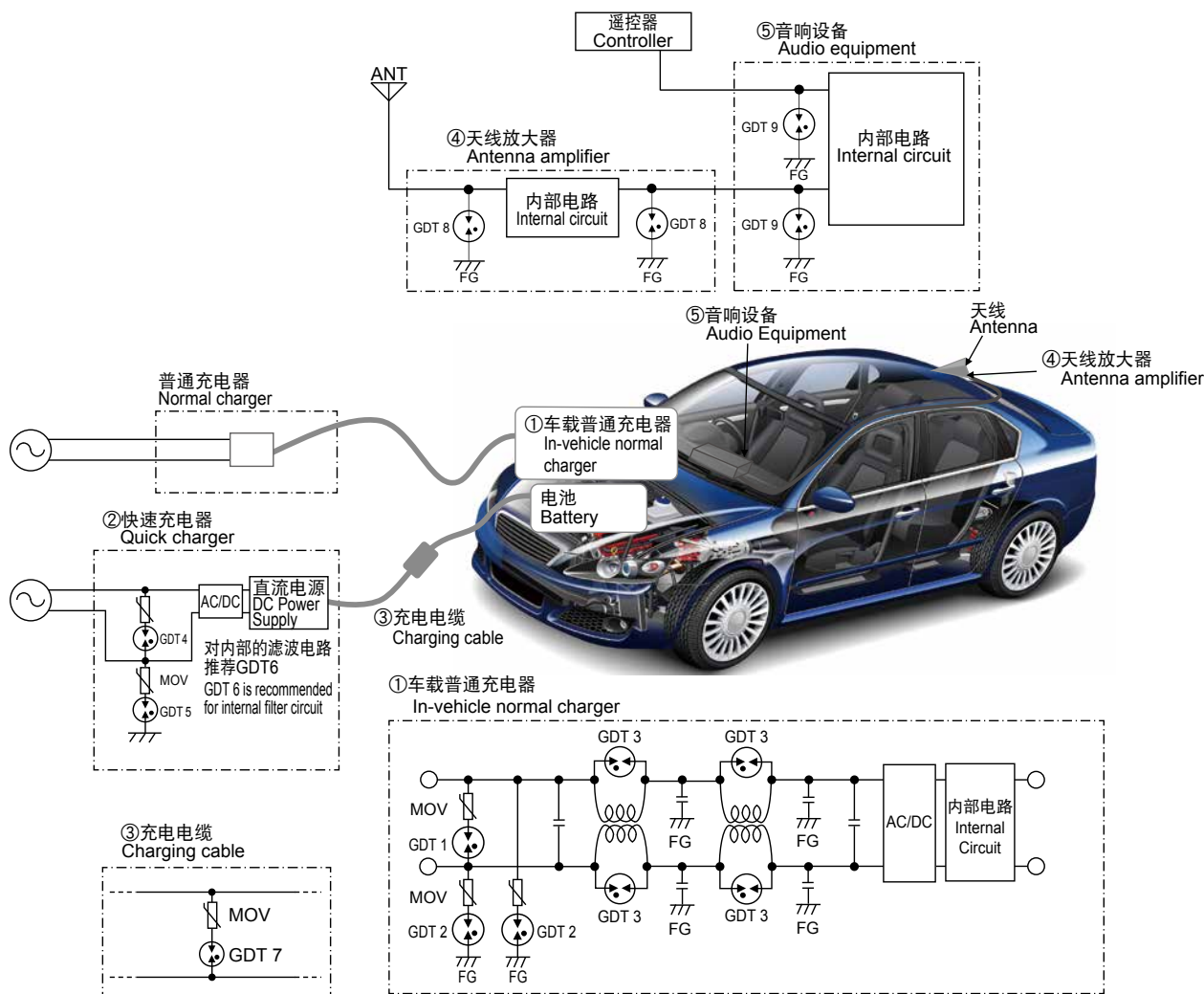
a) 对称电路
Symmetric circuitb) 非对称电路
Asymmetry circuit

■ 推荐部品 Recommended parts

	AC耐电压试验条件 AC Withstand Voltage Test	放电管1 GDT1	压敏电阻 MOV	放电管2 GDT2
~AC125V	Test is not required	DE37-401W	220V~270V (φ 10mm)	CSA70-301L CSA70-401L DE37-301L DE37-401W DE37-501M DSS-301L DSS-401M
	AC1,000V AC1,200V	CDA70-272M FA55-272		
~AC250V	Test is not required	DE37-501M	470V~680V (φ 10mm)	
	AC1,500V	CDA70-302M FA55-302		
	AC1,800V	CDA70-362M FA55-362		
	AC2,000V	FA55-402		

3) 车载

Automotive



■ 推荐部品 Recommended parts

① BMU

AC耐压 Withstanding voltage	放电管1 GDT1 Line to line	放电管2 GDT2 Line to GND	放电管3 GDT3 Resonance measure
—	DA53-501M	DA53-501M	DE37-301L
AC1,000V-1min. AC1,200V-3s		DA53-272M	
AC1,500V-1min.		DA53-302M	
AC1,800V-3s		DA53-362M	

② 快速充电器 (输入为AC200V时) Quick charger (In the case of input AC200 V)

AC耐压 Withstanding voltage	放电管4 GDT4 Line to line	放电管5 GDT5 Line to GND	放电管6 GDT6 Resonance measure
—	DA53-501M	DA53-501M	DE37-301L
AC1,500V-1min.		DA53-302M	
AC1,800V-3s		DA53-362M	

③ 充电电缆 (输入为DC500V时) Charging cable (In the case of input DC500V)

AC耐压 Withstanding voltage	放电管7 GDT7 Line to line
导线型 Lead type	DA53-701M

④ 天线放大器 Antenna amplifier

⑤ 音响设备 Audio equipment

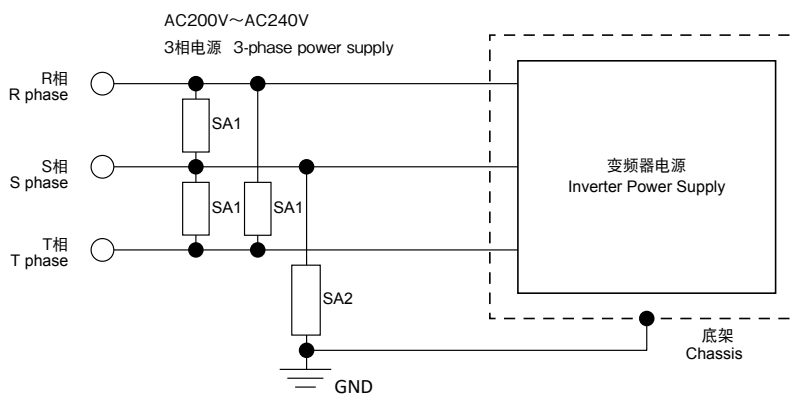
表面贴装型 SMD type	放电管8,9 GDT8,9
导线型 Lead type	CSA30-141N, CSA20-141N
	DSP-141N, DSP-201M

4) 使用三相电源的设备

※ 在 (R、S、T 相)-GND 之间进行 AC 1500V 绝缘耐压试验的实施例。

※ Example of a dielectric withstanding voltage test carried out at a voltage of AC1,500V applied between the R-S-T phase and the ground.

Equipment using a three-phase power supply

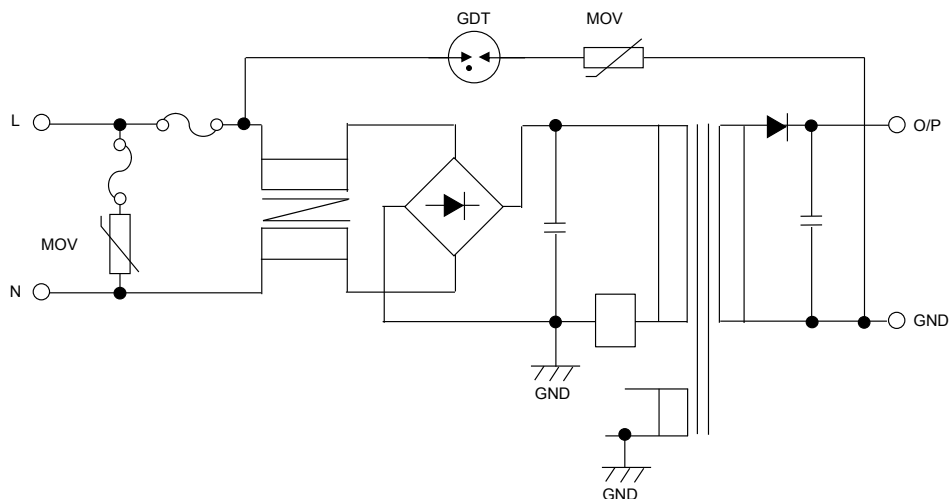


■ 推荐部品 Recommended parts

	复合品 Combination type	部品 Component type	
		放电管 GDT	压敏电阻 MOV
SA1	DSANR-3	DSA-501MA-05	220V~270V(φ 10)
SA2	DSANR-5	DSA-302MA-05	470V~680V(φ 10)

5) AC 适配器

AC/DC adapter

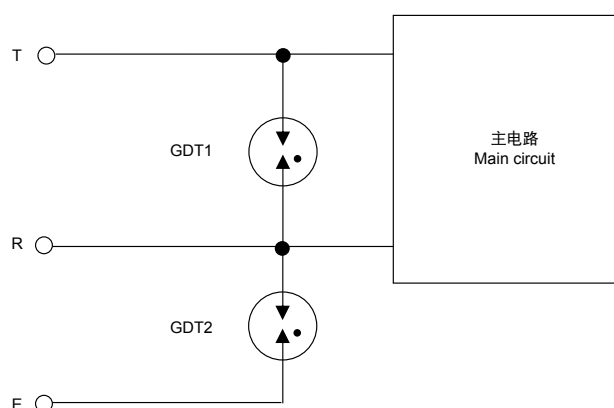


■ 推荐部品 Recommended parts

	放电管 GDT	压敏电阻 MOV
表面贴装型 SMD type	CDA70-272M	470V~
引线型 Lead type	FA55-272, DA53-272M	

6) 电话线路 / ADSL

Telephone line / ADSL

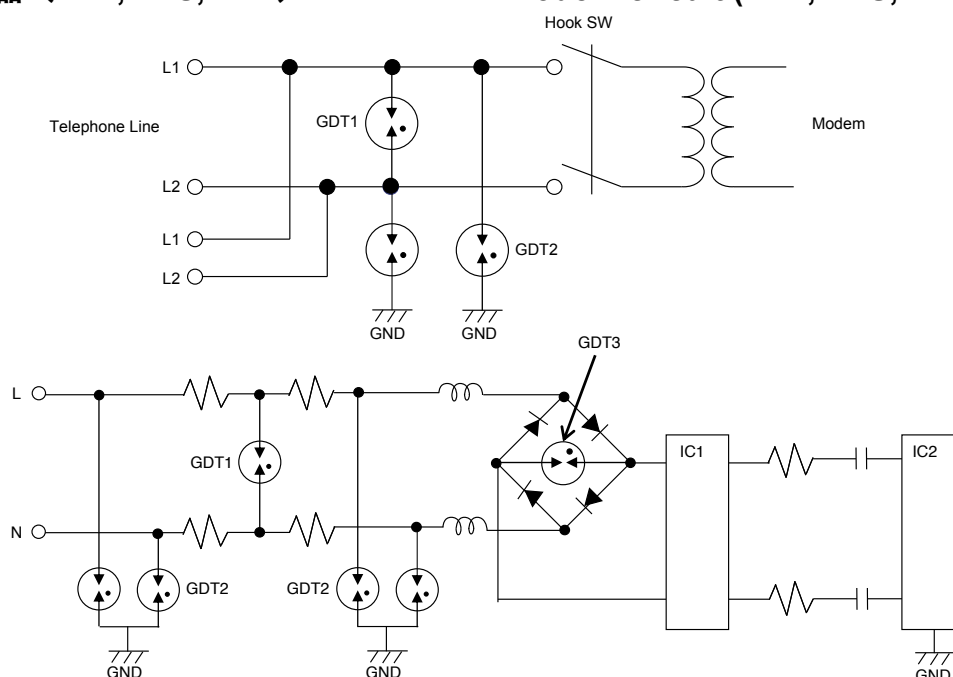


■推荐部品 Recommended parts

		表面贴装型 SMD type	引线型 Lead type
GDT1		CSA70-301L	DSS-301L
GDT2	AC耐电压试验:无 AC withstanding test: none	CSA70-301L	DSS-301L
	AC耐电压试验:AC1,500V-1min. AC withstanding test: AC1,500V-1min.	CDA70-302M	FA55-302 DA53-302M DSS-302M

7) 调制解调器 (FAX, KTS, PBX)

Modem circuit (FAX, KTS, PBX)

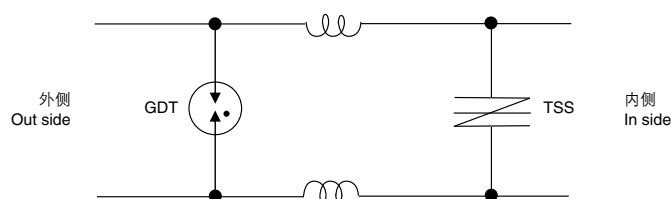


■推荐部品 Recommended parts

		表面贴装型 SMD type	引线型 Lead type
GDT1		CSA70-301L	DSS-301L
GDT2	AC耐电压实验无 AC withstanding:none	CSA70-301L	DSS-301L
	AC耐电压实验 AC1,000V-1min,AC1,200V-1min ACwithstandingtest AC1,000V-1min,AC1,200V-1min	CDA70-272M	DSS-272M
	AC耐电压实验 AC1,500V-1min ACwithstandingtest AC1,500V-1min	CDA70-302M	FA55-302 DSS-302M
GDT3		CSA70-301L	DSS-301L

8) 传感器及数据线

Sensor and data line

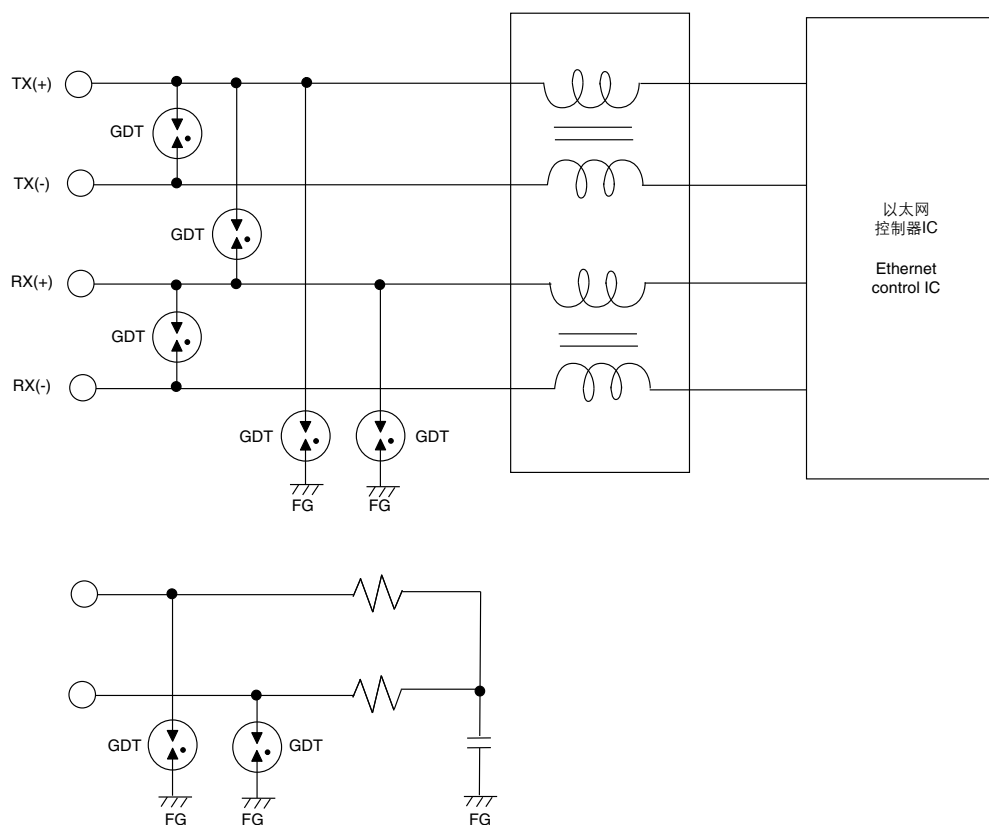


■ 推荐部品 Recommended parts

	放电管 GDT	晶闸管电涌抑制器 TSS
表面贴装型 SMD type	DSS-201M	硅型吸收器:30V Silicon type Absorber : 30V
引线型 Lead type		

9) 以太网 (100BASE-TX,1000BASE-T)

Ethernet (100BASE-TX / 1000BASE-T)

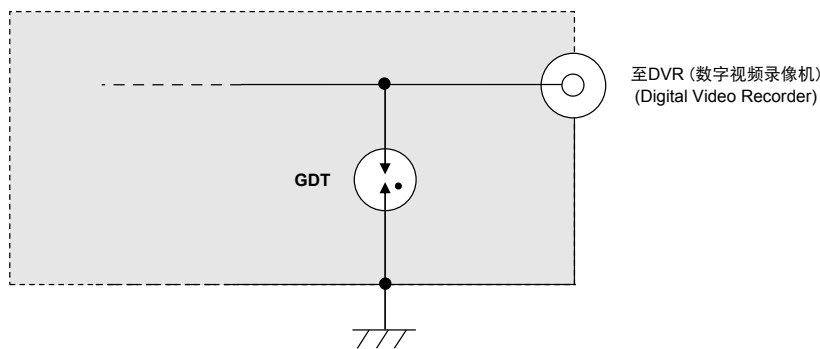


■ 推荐部品 Recommended parts

	放电管 GDT
表面贴装型 SMD type	CSA70-301L
引线型 Lead type	DE37-301L , DSS-301L

10) 同轴电缆 (监视器)

Coaxial cable(CCTV)

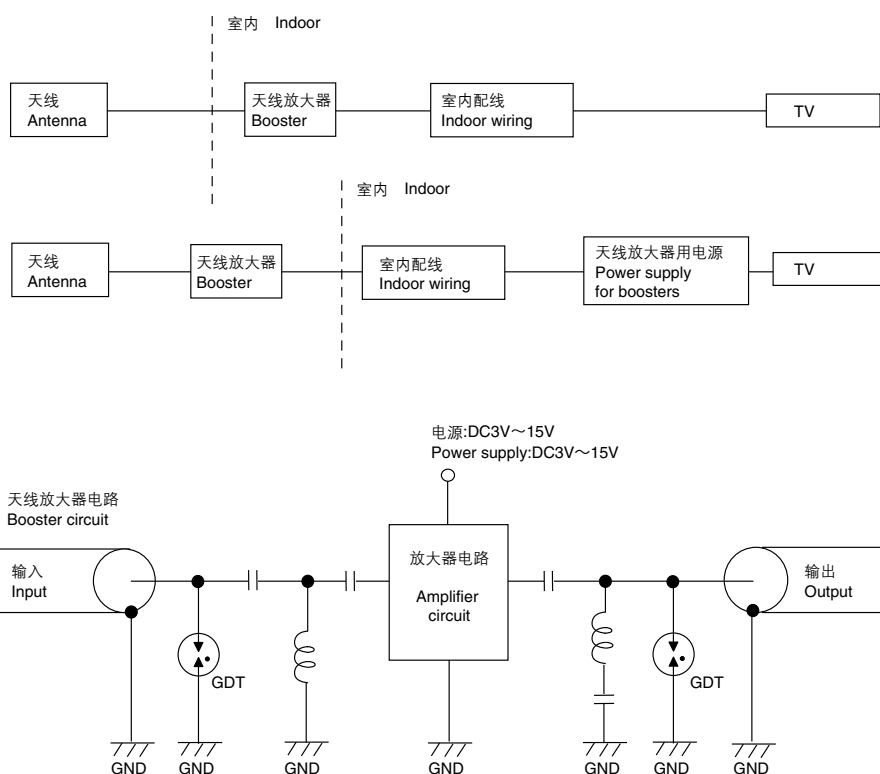


■推荐部品 Recommended parts

	放电管 GDT
表面贴装型 SMD type	CSA70-301L
引线型 Lead type	DE37-301L, DSS-301L

11) 天线放大器电路 (卫星广播用、一般电视设备用)

Booster circuit (Satellite broadcasting, Television)

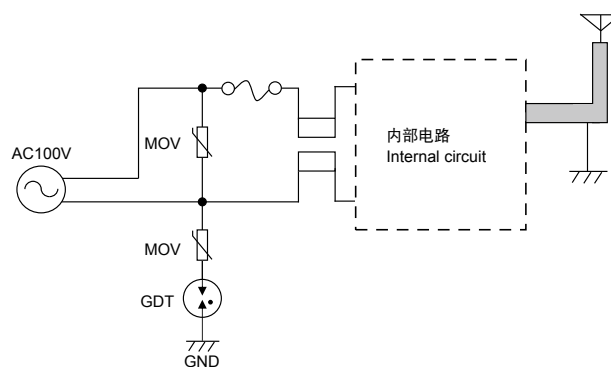


■推荐部品 Recommended parts

	放电管 GDT
表面贴装型 SMD type	CSA70-301L
引线型 Lead type	DE37-301L, DSS-301L

12) 电视天线电路

TV antenna circuit



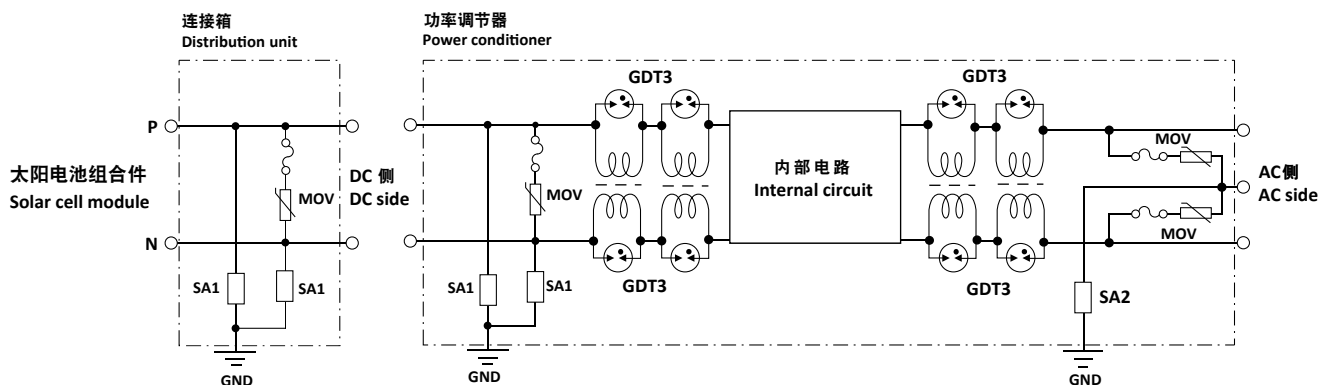
■ 推荐部品 Recommended parts

	放电管 GDT	压敏电阻 MOV
表面贴装型 SMD type	CDA70-272M	220V~270V(φ 10)
引线型 Lead type	DA53-272M FA55-272, DSS-272M	

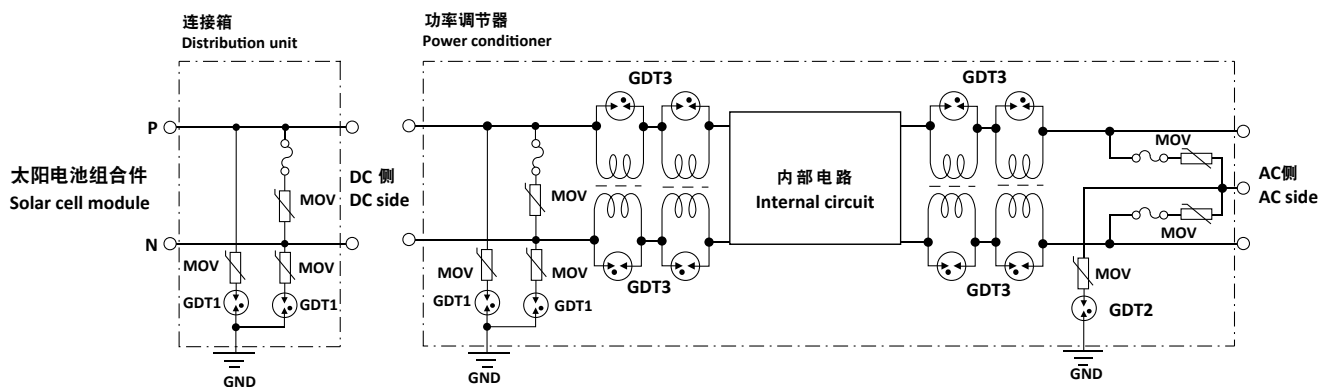
13) 太阳能发电系统

Photovoltaics system

【高信赖性系统用 High quality system】



【标准系统用 Standard system】

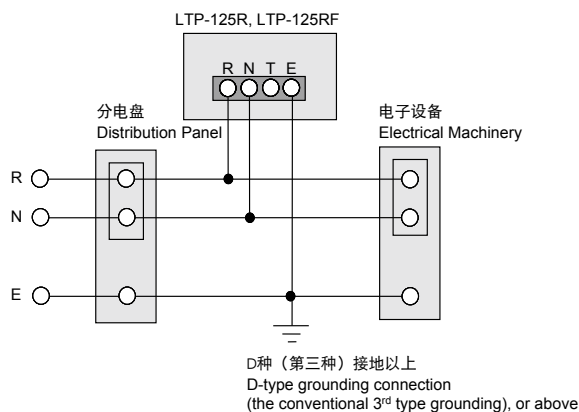


■ 推荐部品 Recommended parts

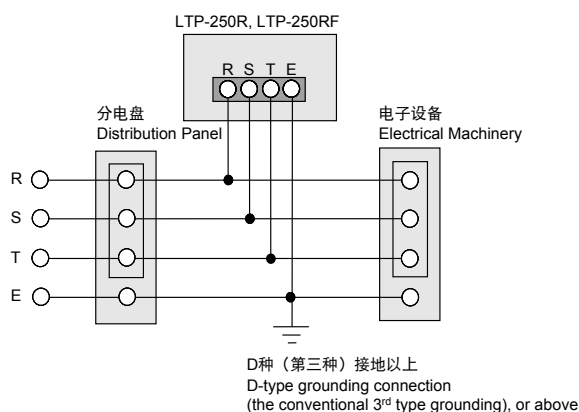
使用电压 Voc Open circuit voltage	高信赖性系统用 High quality system			标准系统用 Standard system		
	SA1	SA2	GDT3	GDT1	GDT2	GDT3
DC100V	DSAHR-1	AC125V: DSAHR-1 AC250V: DSAHR-3 AC400V: DSAHR-5	DA53-501M	DSA-301LA	AC125V: DE37-301L DSA-301LA AC250V: DE37-501M DSA-501MA AC400V: DE37-102M CDA70-102M DSA-102MA	DE37-301L CSA70-301L
DC250V	DSAHR-3			DSA-501MA		
DC450V	DSAHR-4			DSA-701MA DA53-701M CDA70-701M		
DC600V	DSAHR-5			DSA-102MA CDA70-102M		
DC750V	—			DSA-152MA		
DC1,000V	—			DSA-152MA		
DC1,500V	—			DSA-282MA DA53-272M CDA70-272M		
DC2,000V	—			DSA-302MA DA53-302M CDA70-302M		

14) 配电盘

单相: LTP-125 □
Single-phase: LTP-125 □

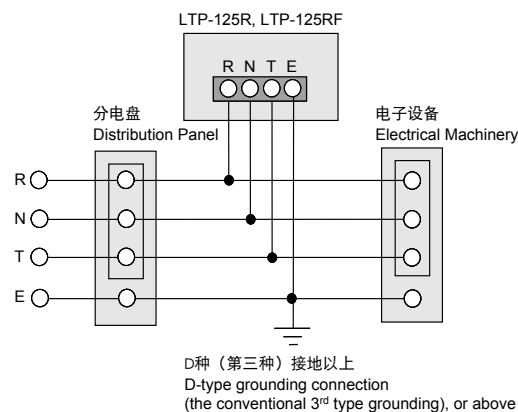


3相3线: LTP-250 □
Three-phase three wire:

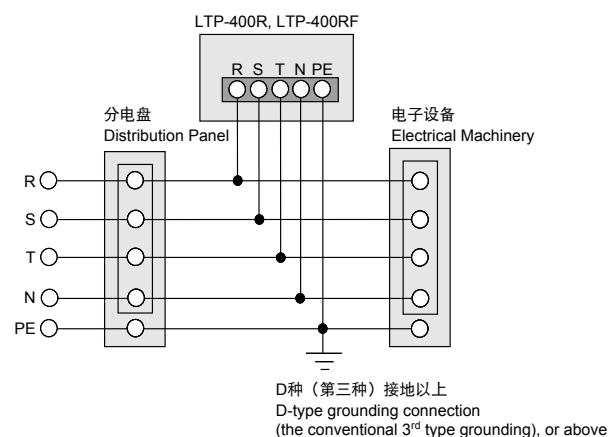


Switch board

单相3线: LTP-125 □
Single-phase three wire: LTP-125 □



3相4线: LTP-400 □
Three-phase four wire: LTP-400 □



使用注意事项

请务必在 D 种接地以上使用接地。请参照连接方法，使导线与端子紧密连接。

使用附带的绝缘塑料电线时，请切断多余电线，使其不成环，可在最短距离内布线。

本产品是非防水型。请勿使用高温和多湿的地方、阳光直射的地方、有粉尘和腐蚀性气体的地方等作为安装场所。

本产品适用于电源线的诱导雷电电涌，不适用于直击雷电电涌和通信线电涌等。

实施兆欧表测试时，请取下后再进行。

Precautions for use

Grounding to Earth needs to be class D or above. Connect lead securely to terminal and follow good connection guidelines.

Cut the supplied insulated vinyl electric wire as short as possible when installing.

This SPD isn't waterproof. Its location should protect it from high temperatures or humidity, direct sunlight, dust, or corrosive gas.

This unit protects from induced surges from power lines but doesn't protect from direct lightning surge and surge of communication line.

Remove from circuitry if performing a Megger test.

■什么是电涌？～电涌对策是不是会造成困扰？～

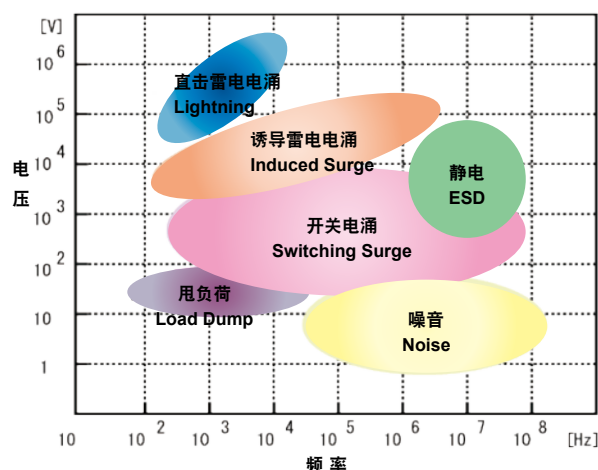


图 1 电涌种类
Fig.1 Surge Types

■诱导雷电电涌

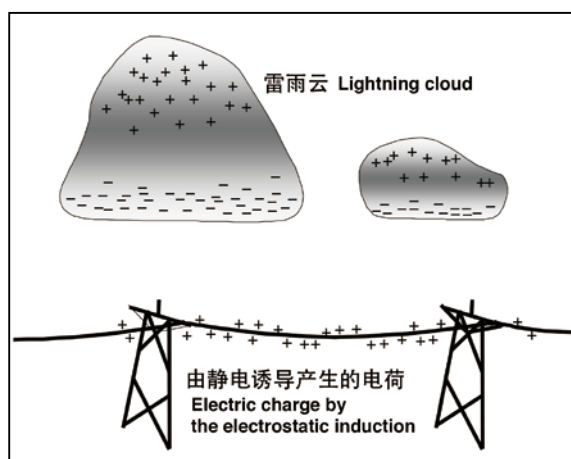


图 2 (a) 静电诱导电涌
Fig. 2(a) Electrostatic induction surge

在夏天的雷雨季节，雷雨云的上部发生正电荷、下部发生负电荷。如果在该雷雨云下方存在输电线或通信电缆，电缆的上方也会聚集正电荷，产生高电压。

由于雷雨云之间或雷雨云与大地之间的放电，导致雷雨云的负电荷消失（减少）后，电缆上聚集的正电荷将解除束缚，向两个方向前进，从而产生静电诱导电涌。

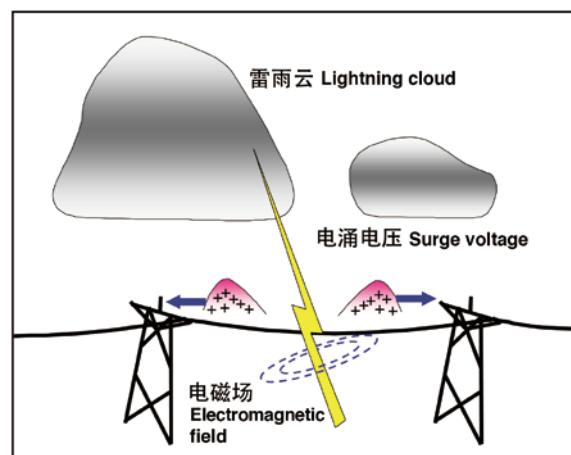


图 2 (b) 电磁诱导电涌
Fig. 2(b) Electromagnetic induction surge

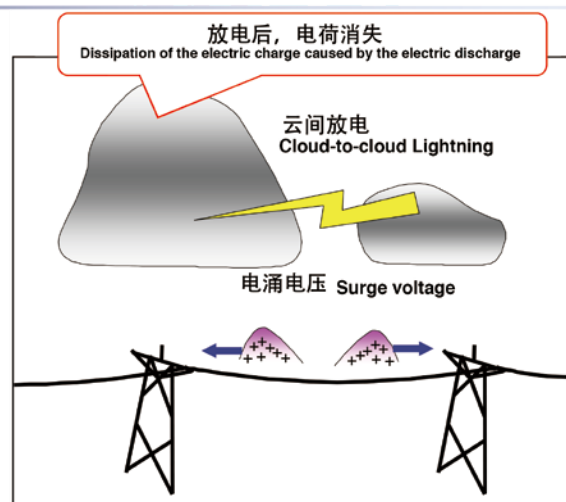
■What is Surge?

电涌是指瞬间发生的异常电压。如图所示，电涌根据产生的原因，分为多种类型。三菱综合材料（株）提供了针对由雷电引起的诱导雷电电涌和静电放电引起的静电电涌（在电路设计中特别容易成为问题）的相关零件 / 解决方案。

Solving Surge Problems

Surge is abnormal transient voltage and is categorized according to where it is originated. At Mitsubishi Materials, we provide countermeasure devices/solutions for circuitry and ESD surge caused by electrostatic discharge as well as induced surge caused by lightning discharge.

■Induced Surge



When lightning occurs in the summer, a negative charge develops in the upper part of the lightning cloud.

When a power transmission line and a communication line cable exist under this lightning cloud, equilateral electric charges collect on the cable and high voltage occurs. Electrostatic induction surge occurs when a positive charge on a cable develops near a negative charge from a lightning cloud. When the cloud releases its charge to another cloud or the ground, the charge on the cable is released and travels in a wave, advancing in either direction.

在雷雨云与大地之间放电（打雷）时，大电流移动，产生电磁场后形成电磁诱导电涌。

如果在落雷点附近存在输电线、通信线等电缆，这些电缆会变为天线，通过电磁诱导，产生异常电压。

在雷雨云之间或雷雨云与大地之间发电时，附近的输电线、通信线等电缆会由于静电诱导或电磁诱导而产生异常电压。上述异常电压被称为诱导雷电电涌。图 2 (a) (b) 显示了电涌的产生机制。

When electric discharge (lightning) occurs between a lightning cloud and the ground, a severe electric current drifts and the electromagnetic induction surge produces an electromagnetic field.

If a power transmission line and the cable of a communication line exist near a lightning strike, they act as an antenna and electromagnetic induction causes abnormal voltage.

When an electric discharge occurs between lightning clouds or between a lightning cloud and the ground, abnormal voltage occurs by electrostatic induction and electromagnetic induction to the neighboring power transmission line or communication line. This is what is called Induced Surge as illustrated in fig.2 (a) and (b).

■ 诱导雷电电涌的侵入途径

■ Invasion of Induced Surge

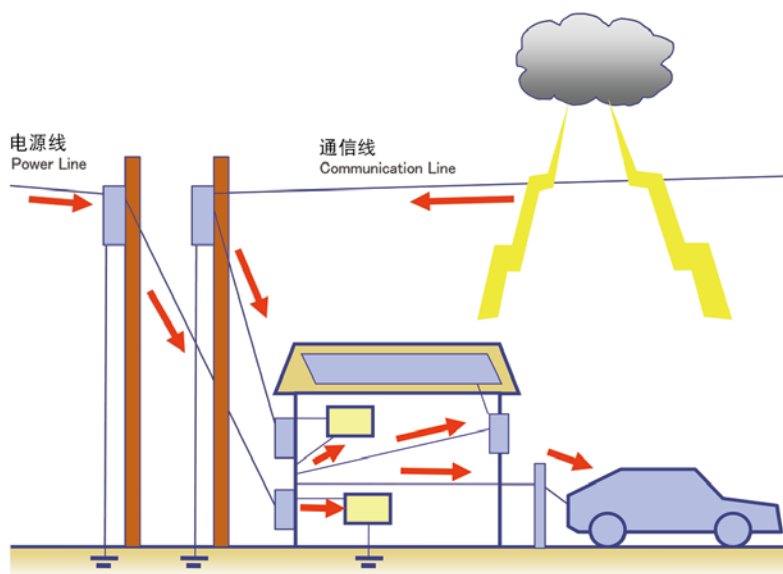


图3 电涌的侵入途径
Fig.3 Invasion of Induced Surge

由此产生的诱导雷电电涌通过电源线、通信线等侵入电子设备。

Induced Surge enters electronic equipment through power supply lines or communication lines.

■ 什么是电涌吸收器

■ What is a Surge Absorber?

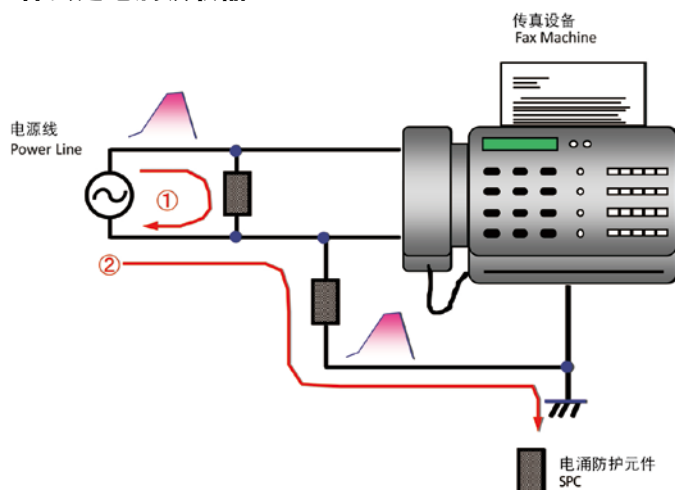


图4 电涌防护设备的对策方法
Fig.4 Example of Surge Protection

保护电子设备免受电涌（异常电压）伤害的零件被称为电涌防护元件（SPC: Surge Protective Components）。

电涌防护元件针对电涌的侵入途径，在①线与线之间或②线与云之间进行。通常，电涌防护元件的电阻较高，几乎没有电流（不会对保护的电子设备造成影响）。

但是，在电涌（异常电压）侵入时，电涌吸收器会在瞬间处于低电阻状态，带走电涌。当电涌消失后，恢复到原来的高电阻状态。

A device protecting electronic equipment from surge (abnormal voltage) is called a Surge Protective Components (SPC). SPC protect from entry of surge between ① the line to line interval or ② the interval from the line to the ground.

SPC typically has a high resistance level and most of the electric currents do not flow (nor influence the electronic equipment). However; when surge (abnormal voltage) enters, the Surge Absorber instantly eliminates surge with low resistance to protect the electronic equipment. When surge is eliminated, the Surge Absorber returns to high impedance.

■ 电阻防护元件

■ SPC: Surge Protective Components

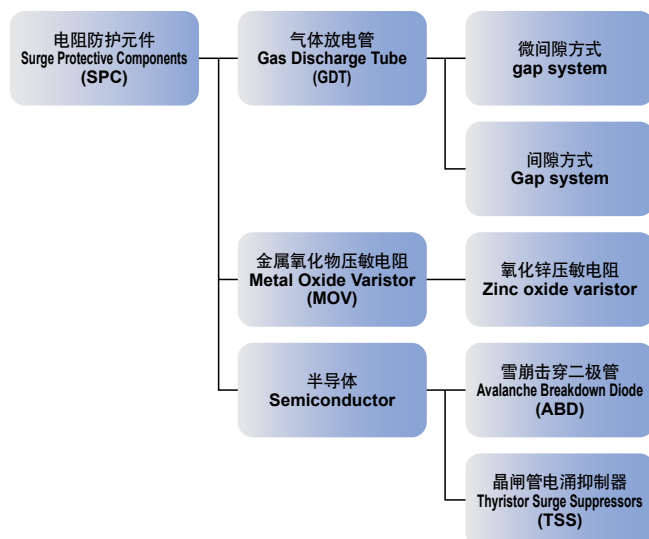


图5 电涌防护元件的种类
Fig.5 Surge Protective Components

GDT : Gas Discharge Tube
MOV : Metal Oxide Varistor
ABD : Avalanche Breakdown Diode
TSS : Thyristor Surge Suppressors

■ 微间隙式电涌吸收器



图 6 微间隙式电涌吸收器 (引线式)
Fig.6 Micro-gap Surge Absorber (Lead wire type)

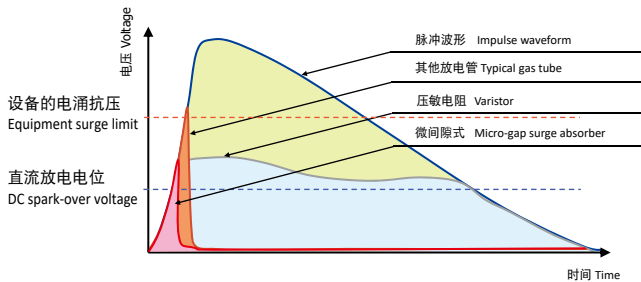


图 8 各种电涌相关零件的电涌响应波形
Fig.8 Surge response waveforms by different surge protections

■ 关于持续电流

1. 什么是持续电流 ...

持续电流如表面意思，是指持续流动的电流，即放电管中的电流持续流动的现场。

通常，电涌吸收器处于高电阻状态下，电流无法流通。电涌吸收器施加电涌后，则会导电，处于低电阻状态，使电涌通过，保护电路。在电涌消失后，则恢复原来的高电阻状态。然而，在低电阻状态下，如果施加可维持电涌吸收器电流的电压后，会出现如下现象：即使在电涌消失后，也可维持放电，不会回到原来的高电阻状态，电流持续流通。这一现象被称为持续电流。

可观察到持续电流现象的物品是放电管、半导体类开关型电涌吸收器。上述元件的特征包括吸收电涌（通过）时的工作电压（剩余电压）低于工作开始电压等。

吸收电涌时的低电压拥有将施加于被保护设备的压力抑制在较低水平的优点，但同时也存在如下问题：因某种原因，来自电源等的电流流入后，由于电压较低，从而导致无法阻止电流。

根据 JIC C 5381-311，当电流的流动持续超过 150msec. 时，可判断已发生了持续电流现象。

关于持续电流的机制，将在下文进行具体说明。这里将介绍放电管的放电状况、电源特性、持续电流条件。

■ 放电管的 V-I 特性

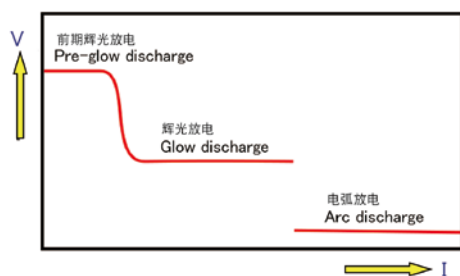


图 9 放电管的 V-I 特性
Fig.9 V-I properties of gas discharge tubes

- 前期辉光放电
维持放电的电压与直流放电电位基本相等。是会发出微弱光芒的放电。
- 辉光放电
拥有针对电流变化的恒定电压特性。
维持放电的电压因电极的材质、所使用气体的种类而异。
放电光会覆盖部分电极。
- 电弧放电
是放电的最终形态，较强的电流流通，发出强光，并放电。
维持放电的电压（放电管的端子间电压）为数十 V。

■ Micro-gap Surge Absorber

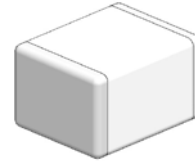


图 7 微间隙式电涌吸收器 (表面安装式)
Fig.7 Micro-gap Surge Absorber (SMD type)

【特点】

- 1) 采用微间隙式，可获得出色的电涌应答特性
- 2) 10MΩ 以上的高绝缘电阻特性
- 3) 1pF 以下的低静电容量
- 4) 无明暗之差
- 5) 无极性
- 6) 支持引线式和表面安装式

<Benefits>

- 1) Excellent surge response
- 2) High insulation resistance (more than 10MΩ)
- 3) Low capacitance (less than 1pF)
- 4) No dark effect
- 5) Two-directional
- 6) Lead wire type and SMD type available

■ About Follow-On Current

What is Follow-on current?

Follow-on current is electricity that will continue to flow; in this case it is a phenomenon where the current in a discharge tube continues to flow.

Normally, Surge Absorbers are in high impedance. When a surge enters the Surge Absorber, it will drop to low impedance, allowing the surge to bypass the electronic circuit it is protecting. After the surge has passed, the Surge Absorber should return to high impedance.

However, when the Surge Absorber is in low impedance and there is sufficient voltage on the line to keep current flowing, the surge ends and the Surge Absorber remains in discharge. The Surge Absorber fails to return to high impedance and the current continues to flow. This is a phenomenon known as follow-on current.

Surge Absorbers that display this follow-on current are discharge-type and semiconductor switching-type. A characteristic of these absorbers is that during surge absorption (bypass), the operating voltage (remaining voltage) is lower than the starting voltage.

The advantage of these Surge Absorbers is that during suppression, the voltage is held very low, so it reduces stress on the equipment. However, a problem arises when the line current of the equipment is high enough that it continues to drive the Surge Absorber even when the voltage is low.

Follow-on current mechanisms are explained further in the next chapter, along with the discharge tubes.

■ V-I properties of gas discharge tubes

微间隙式电涌吸收器属于放电管的一种。该放电管开始放电后，放电形态可逐步变为前期辉光放电、辉光放电、电弧放电，具体如下图所示。

关于该放电管的 V-I 特性，请见显示了放电管的电压与电流的关系的示意图。其特征在于：放电管放电，电流流通后，转变为辉光放电、电弧放电，放电电压下降。相反，放电停止后，从电弧放电转为辉光放电，放电电压上升。

The micro-gap type Surge Absorber is a type of discharge tubes. The discharge in the tube changes from pre-discharge to glow discharge, then to arc discharge as illustrated in Fig.9.

The illustration below also shows the V-I characteristics between voltage and current for the discharge tube.

When the tube is discharging, electric current flows and moves to glow discharge then to arc discharge as the discharge voltage decreases. On the other hand, when the discharge decreases, the voltage increases as it moves from arc discharge to glow discharge.

- Pre-glow discharge
The voltage to maintain the discharge is equivalent to the DC breakdown voltage. A faint light can be seen from at this point.
- Glow discharge
The constant voltage rate remains as the current changes. The voltage to maintain the discharge depends on the electrode material and the gas in the tube. The discharge light covers portion of the electrodes.
- Arc discharge
At the end of discharge and a large current flows through the part and it puts out a bright light. The maintaining voltage at this point (voltage between the discharge tube terminals) is in the 10's of volts range.

■什么是延续

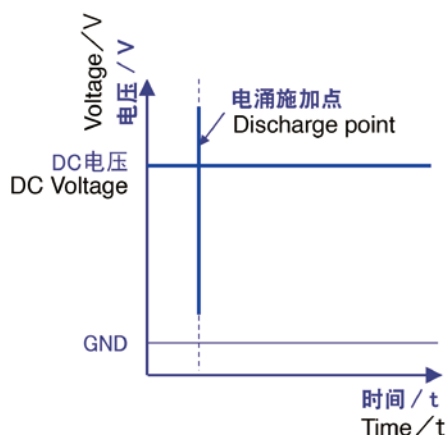


图 10 未发生延续
Fig.10 No Holdover occurring

在 DC 电压重叠的电路中使用放电管时，如果电涌侵入，因电涌电压会导致放电管放电后，来自电源的电流会回流，造成放电无法停止的现象。

发生延续后，例如在 CRT 的驱动电路发生延续时，会出现画面变暗等问题，由于放电无法停止，放电管的玻璃可能会熔化、冒烟、着火。

■延续的机制

在直流电源的输出电压和输出电阻状态发生变化，满足了向放电管供电的条件时，会发生延续。

那么，向放电管供电的条件是一种怎样的状态呢？电源的带那样 (V_0)、串联电阻 (R)、放电电流 (I) 以及端子电压 (V) 的关系如下所示，使用图 12 的直线表示。

$$v = V_0 - I \cdot R \quad \dots (1)$$

如果电压 V_0 固定，通过增减电阻，电源的输出特性倾向会发生变化，与放电管的 V-I 特性可能会有交点，也可能没有交点。电源的特性直线显示了电源的可输出电压与电流的关系，放电管的 V-I 特性显示了可获得放电管的电压与电流的关系。

电涌侵入后，放电管处于电弧放电的形态下，电涌会被吸收。电涌消失后，放电形态从电弧放电转为辉光放电，再经过前期辉光放电后，即将消失时，电源的输出特性与放电管的 V-I 特性特定的关系变得非常重要。

电源的电阻增大，如图 12 所示，电源的输出特性（粉红色）与放电管的 V-I 特性（红色）没有交点时，来自电源的电流不会发生回流，因此不会出现持续电流现象。然而，当电源的输出特性（粉红色）与放电管的 V-I 特性（红色）存在交点时，电源可持续向放电管供电，在电涌消失后，从电弧放电转为辉光放电、前期电弧放电转为辉光放电，电流减少的过程中，电弧放电或辉光放电的交点可持续放电。这被称为延续，电源的输出特性与放电管的 V-I 特性存在交点是电源向放电管供电的条件。

在图 12 中，辉光放电与电源特性的交点或电弧放电与电源特性的交点可能会出现持续电流现象。

为防止延续情况的出现，必须确保电源的输出特性与放电管的 V-I 特性没有交点，这点非常重要。

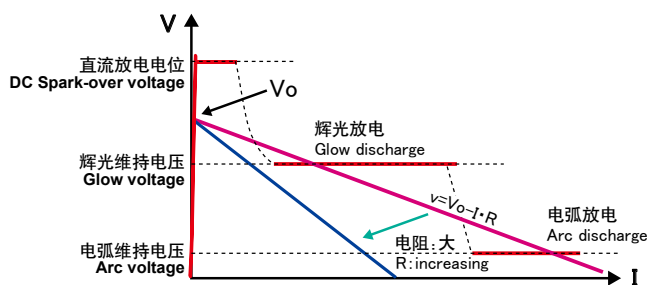


图 12 放电管的 V-I 特性与电源的输出特性的关系
Fig.12 Relations of V-I characteristic of gas discharge tube and output characteristic of the power supply

■What is Holdover?

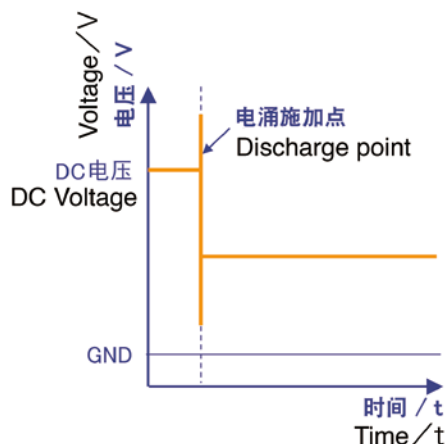


图 11 发生延续
Fig.11 Holdover occurring

When a discharge tube is used on a circuit that has a DC voltage component, there is a phenomenon occurs, called holdover, where the discharge in the tube continues being driven by the current from the power supply even after the surge voltage has subsided. When a holdover occurs, for example when it occurs in the drive circuit of a CRT, the screen darkens and discharge in the absorber continues, which can lead to the glass tube melting, smoking or burning.

■Mechanism of Holdover

Holdover can occur when the current is supplied to the discharge tube due to varying conditions of output voltage and output resistance of the DC power supply. What are the conditions that allow current to continue to flow to the discharge tube?

The relation between the power supply voltage (V_0), serial resistance (R), discharge current (I) and the terminal voltage are shown in the linear relation below:

$$v = V_0 - I \cdot R \quad \dots (1)$$

If voltage V_0 is fixed, the slope of the power supply output characteristic line increases or decreases according to the resistance and may or may not intersect with the V-I characteristics of the discharge tube. The characteristic linear line of a power supply shows the relation between the output voltage and current of the power supply. Likewise, the V-I curve of a discharge tube shows the relation between the voltage and the current. When static surge electricity is applied to the discharge tube, the shape of the curve shows that the surge is being absorbed during arc discharge.

As the surge ends, the discharge goes from arc discharge to glow discharge and then to a state just prior to glow discharge. At this time, the relationship between the discharge tubes V-I curve and the power supply's output characteristics are very important.

As shown in the figure 12, with a high resistance in the power supply, the output characteristic line (pink) and the discharge tubes V-I characteristic curve (red) never intersect. Therefore, current will not flow from the power supply and follow-on current will not occur.

However, when the output characteristic line of the power supply (pink) intersects with the V-I curve of the discharge tube (red), it is possible for the current from the power supply to flow into the discharge tube. When the surge ends, the current should decrease from arc discharge to the pre-glow state, but instead, the power supply will continue to flow where it intersects in the glow or arc discharge region. This condition where the power supply continues to allow current into the discharge tube is called holdover.

The figure 12 below shows how the power supply continues supplying the current to the discharge tube when its characteristic line intersects the discharge tubes V-I line in the glow or arc discharge sections.

To prevent holdover from occurring, it is important to keep the V-I characteristic line of the power supply from intersecting with the V-I curve of the discharge tube.

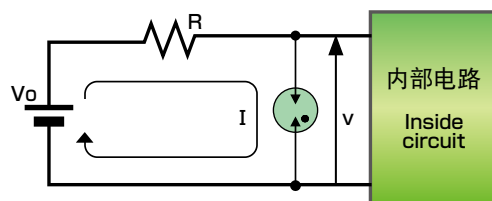


图 13 电源的输出特性
Fig.13 Output characteristic of the power supply

■什么是针对 AC 电源的持续电流

如果将 AC 电源内使用放电管而产生的持续电流应用于 DC 电源，可简单地理解。即图 12 的电源电压 (V_o) 随时间变化。如前页所述，电源电压显示为 $V_o(t)$ 时，该输出特性如下所示。

在输出端显示的电压显示为 v 、电路电流显示为 I

$$v = V_o(t) - R \cdot I \quad \dots (2)$$

由于 $V_o(t)$ 随时间变化，因此 (2) 式如图表所示，为下图左方的斜线。 $V_o(t)$ 显示为

$$V_o(t) = V_o \sin \omega t \quad \dots (3)$$

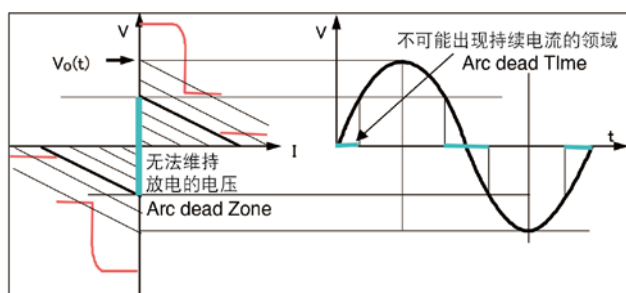
时，仅在电源电压为 0 的点（零交叉点）附近的一段时间内，存在电源的输出特性与放电管的 V-I 特性不存在交点的电压范围、时间范围。

如果是 AC 电源，由于电源电压必定会产生零交叉点，因此来自延续的放电很容易停止。零交叉点附近区域成为无法维持放电的领域，供给放电的电流将被阻断，在这段时间内，经过电离的气体分子恢复到原来的绝缘状态，放电停止。

如果放电停止，由于端子电压不会超过直流放电电位，因此不会重新开始放电。

但是，在这段时间内，如果电离的气体分子没有消失，在放电管两端再次施加电压时（进入施加反向电压的周期），再次施加的电压能够确保放电持续下去，而不会消失。这就是交流电压中的持续电流。

发生持续电流后，放电不会停止，放电管的玻璃可能会熔化、冒烟、起火。



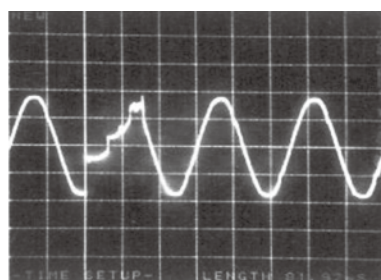
(a) V-I 特性上
(a) V-I characteristics

(b) V-t 特性上
(b) V-t characteristics

图 14 电阻较大时（不可能出现持续电流的领域较长）

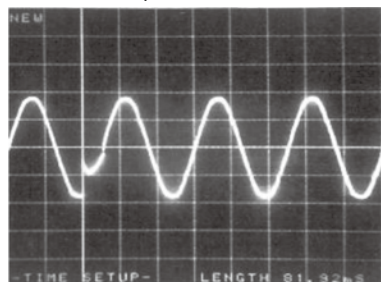
Fig.14 At High Resistance (Long Range of No Follow-on-current)

在交流电压重叠的条件下，作为不会发生持续电流的条件，将能够完全停止放电的电阻插入串联电路中，这点非常重要。



照片 1 0Ω 时（发生持续电流）

Photo 1 At 0Ω (Follow-on-current occurring)



照片 2 0.5Ω 时（因半波持续电路而停止）

Photo 2 At 0.5Ω (Stopped at half wave Follow-on-current)

当电阻为 1Ω 和 3Ω 时，与照片 2 相同，放电因半波持续电流而停止。如果是 AC 电源，与 DC 相比，放电管与串联电路连接的电阻值可以更小。与串联电路连接的电阻值只要超过 0.5Ω 即可，但如果可能，请设为 3Ω（100V）以上。

此外，也有将变阻器作为电阻与串联电路连接的方法。这是将工作电压高于 AC 电压的变阻器与放电管串联，用作电阻，在放电管不会出现半波持续电流的情况下，停止放电的方法。

变阻器电压的选择方法如下所示。

AC100V……变阻器电压 220V 以上

AV200V……变阻器电压 470V 以上

本公司的电源用吸收器包括 DSANR 系列和 DSAZR 系列，都实施了持续电流对策。

特别可能存在持续电流、延续风险的应用软件如下所示。

- 1) 延续
使用了 DC 电源的电路
- 2) 持续电流
使用了 AC 电源的电路

■Follow-on current from AC sources

When DC is the power supply, follow-on current occurring in gas discharge tubes for AC sources is easy to understand.

In the figure 12, the only difference is that the power supply voltage (V_o) changes with time. As shown on the previous page, when the power supply voltage is shown as $V_o(t)$, the output power characteristics are displayed as follows:

With " v " being the voltage at the power out terminal, and " I " the current of the circuit,

$$v = V_o(t) - R \cdot I \quad \dots (2)$$

$V_o(t)$ will vary with time, so when displaying the above equation on a graph, it will appear as in the figures below in the shaded areas. Then when $V_o(t)$ is shown as:

$$V_o(t) = V_o \sin \omega t \quad \dots (3)$$

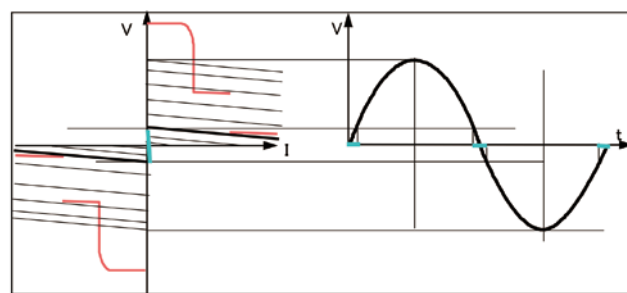
When the power supply voltage becomes 0 (zero cross), there is a short time where the voltage range and time range of the power supply output and discharge tube V-I curve do not intersect.

For an AC power supply, because there is always a zero crossing of the supply's voltage, it is easier to stop the discharge than in the case of holdover. In the vicinity of the zero crossing, it is impossible to maintain the discharge since the current to the discharge is cut off. The discharge is then halted by the ionized gas molecules returning to their normal state.

Because the terminal voltage does not exceed the direct current break down voltage, if the discharge is halted, it will not be able to start again.

However, if the gas molecules remain ionized during this period and voltage is again applied to both terminals of the discharge tube (enters the cycle of opposite voltage), this newly applied voltage will not allow the discharge to end and it will continue in the discharge mode. This is follow-on current for alternating current.

When this type of follow-on current occurs, the tube stays in a discharge mode and the glass of the tube will begin to smoke, melt and possibly ignite.



(a) V-I 特性上
(a) V-I characteristics

(b) V-t 特性上
(b) V-t characteristics

图 15 电阻较小时（不可能出现持续电流的领域较短）

Fig.15 At Low Resistance (Short Range of No Follow-on-current)

It is important to utilize a resistance in series that is sufficiently large enough to prevent follow-on-current from occurring according to the conditions of the alternating current.

With 1Ω and 3Ω resistance, results are the same as those in photo 2, as follow-on-current is disrupted and discharge is stopped.

For AC power sources, the resistance value that is connected in series with the discharge tube is small in comparison to DC sources.

If the series resistance is 0.5Ω or greater, it should be sufficient; however, for safety, a value of 3Ω (for 100V) or greater is recommended.

In addition, there is a method to use a varistor in series that acts as a resistor. In this case, the varistor must have an operating voltage greater than the AC voltage and be placed in a series with the discharge tube. Unlike the resistor, discharge will be stopped without follow-on current occurring during the first half of the wave.

Selection of varistor voltage:

For AC 100V : $V_{1mA} \geq 220V$

For AC 200V : $V_{1mA} \geq 470V$

Our DSANR and DSAZR series are made for power supplies and are designed to prevent follow-on current.

At risk applications of holdover or follow-on-current:

- 1) Holdover
Circuits using DC power sources
- 2) Follow-on current
Circuits using AC power sources

使用注意

Handling Precautions

■浪涌吸收器系列使用注意

使用浪涌吸收器系列时，根据使用条件(电源条件，周边环境条件，贴装条件等)，有可能发生以下异常，如火灾事故，触电事故，产品故障等，因此请核查下列事项之后使用。

但是关于未声明的事项，请咨询本公司。

1. 严守事项

(1) 确认额定性能

每个产品有各自的浪涌破坏容量、浪涌寿命，和使用温度范围等规定，请在额定性能的规定下使用。若超过额定性能的规定使用时，会引起性能退化或玻璃管破坏，并可能会导致冒烟，起火。

(2) 避免意外行为所造成的事故

该产品的毁坏时，玻璃有可能飞散，因此请把产品装入容器中。

2. 注意事项

(1) 电流值/通电时间

在连续放电下使用时，功能可能会降低，因此测量直流放电开始电压时请多加注意。

(2) 关于续流的发生

AC或DC电源电路中使用本产品时，因电源的电压供应可能会发生续流。使用本产品时请与压敏电阻串联连接，以防止此类续流现象。

(3) 交流电压试验

实施本产品的交流电压试验时，请勿施加超出保证值得电压。此外，使用针表显示交流电压测试设备时，请用数字显示式万用表核实电压。使用交流电压测试设备时，微小的输入电压的变动，输出电压可能有很大的变动。

输入电压有变动时，请安装稳压电源，控制电压变动。

此外，请勿在高温和潮湿的环境中测量。绝缘电阻降低等，由此标准值可能无法得到满足。

放电管和电线的模式接近时，交流电压会下降。因此放电管和电线的模式之间请保持1毫米以上的间距。

(4) 落下/冲击

玻璃管型产品，因落下/震动及冲击等玻璃碎裂时，可能无法保持其功能，特请谨慎处理。

(5) 成形

成形时使用本产品的导线时，特请注意玻璃管的碎裂。

(6) 保管

①请保管在正常温度和湿度(温度：40℃以内，湿度：70%RH以内)的环境中。

②交付产品后，请在6个月内使用。

③请勿保管在直接照射阳光的场所。

④请勿保管有发生毒气体(腐蚀性气体等)和灰尘多的场所。

⑤有急速的温度变化，导线有可能因冷凝而腐蚀，请保管在温度变化少的场所。

(7) 导线

因本产品是导线式端子零件，故在运输过程中振动等会使导线有所弯曲，请给予谅解。

3. 免责声明

(1) 本规范中所述的产品用途为一般消费者产品使用为前提而设备。

(2) 安装在医疗设备，航空设备，核电设备等，发生故障时有可能对人体造成影响，或对社会造成巨大损失的设备时，与一般消费者设备不同需要高可靠性。考虑以上用途时，请事先与本公司联系。

■Caution in Surge Absorber series usage

In case that a surge absorber series is used, if an abnormality takes place because of peripheral conditions of the surge absorber (power source conditions, environment, mounted conditions, etc.), fire, electric shock, product failure may be occur, so confirm the next matter sufficiently, and please use. For more questions, contact us.

1. Precautions to be strictly observed

(1) Confirmation of performance ratings

Use the surge absorber within its rated range of performance such as surge current capacity, surge life and operating temperature range. If used outside the range, surge absorber can be degrade and have glass fracture, which may result in smoking and ignition.

(2) Avoiding accidents due to unexpected phenomena

In the event of fracture of surge absorber, its pieces may scatter; hence, put the case or cover of the set product in place.

2. Application notes

(1) Current value • Test current time

There is a case where an electric characteristic deteriorates in continuous-discharge, in case of measuring DC spark-over voltage.

(2) Concerning Hold-Over

Hold-over may occur by power supply, in case this product is used in AC or DC power supply circuit. We recommend using a varistor, electrically connected in series.

(3) AC withstand voltage test

Do not apply the voltage over a guaranteed value, in case of the AC withstand voltage test. Please be sure the voltage with voltmeters, such as digital multi-meter, in case to perform a voltage setup of AC withstand voltage tester with analog display. By change of slight input voltage, output voltage may change a lot. So if there were changes of input voltage, installation of stabilization power supply is recommended to suppress voltage change.

For AC electric strength to fall, when the wiring pattern approaches with Absorber, please leave more than 1 mm of space of Absorber and the wiring pattern and use.

(4) Fall and a shock

Glass may be cracked by fall, vibration, a shock, etc. Since it may become impossible to maintain the characteristics when glass has crack, please be careful of handling enough.

(5) Forming

Please be careful enough not to cause a crack of glass and a chip, in case of lead forming.

(6) Storage

① Please store at a temperature up to 40℃ and at humidity below 70%RH.

② This products should be used within 6 months after delivery.

③ Avoid direct sunlight.

④ Avoid the place where poisonous gas and dusty condition.

⑤ Avoid rapid temperature change in the storage area, otherwise dew condensation may occur and a lead wire may corrode.

(7) Lead wire

This product has lead wire. A lead may slightly bend by vibration in transport condition.

3. Notice

(1) Parts shown in the specification are meant for general commercial products.

(2) Electronic components used in equipment that can have a series effect on human life or society, such as medical equipment, equipment for use in space, nuclear related equipment, etc. requires higher reliability parts than those found in general commercial electronics. For these types of applications not mentioned in the specification, please contact our charge sections.

CDA70 系列是贴片式电源线用浪涌吸收器。
实现高品质冲击响应特性和 0.6pF 以下低静电容量。
虽然是 4032 形状的小型低背贴片，但是具备 8/20ms、2,000A 型的抗冲击破坏力。

CDA70 is a radial shaped surge absorber for power supplies. It has excellent surge protection characteristics and its capacitance is lower than 0.6pF. It's small but withstands 2,000A (8/20 μ s) surges.

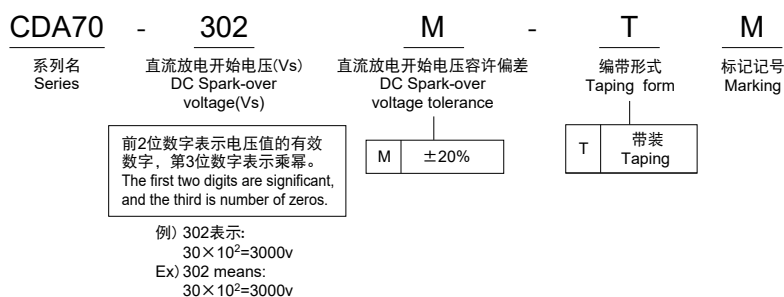
■特点

- 以 4032 形状的小型贴片应对自动安装。
- 应对正流、回流钎焊。
- 可应对各种 AC 耐压测试。
- 高品质浪涌响应性。
- 0.6pF 以下的低静电容量、100M Ω 以上的高绝缘阻抗。
- 稳定应对反复浪涌。
- 已取得 UL1449 规格。
- RoHS 适应品。
- 使用温度范围（一般规格）：-40 ~ 125℃
- 保存温度范围（一般规格）：-40 ~ 125℃

■Features

- Standard small chip package ; EIA 1612, height ; 2.3 $\pm$ 0.2mm
- Can be used with flow or reflow solder
- Compliant with various AC withstanding voltage tests
- Excellent surge response
- Capacitance $\leq$ 0.6pF, insulation resistance $\geq$ 100Mohm
- Stable for repeated discharge tests
- UL1449 Recognized
- RoHS compliant
- Operating temperature limit : -40 ~ 125℃
- Storage Temperature Range : -40 ~ 125℃

■型号构成 Part number system

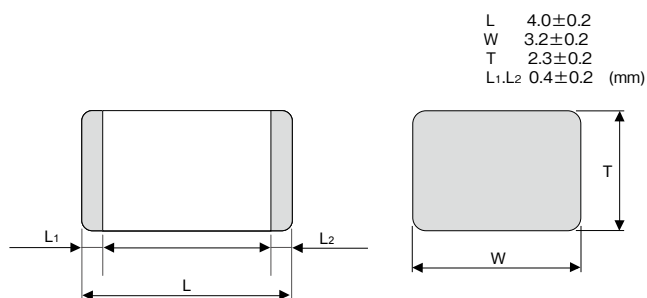


■特性 Characteristics

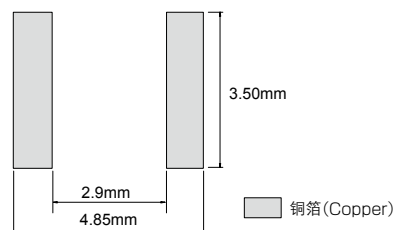
型 号 Part number	直流放电开始电压 DC spark-over voltage Vs	绝缘阻抗 Insulation resistance IR		静电容量 Electrostatic capacitance 1kHz-6V max C	浪涌耐量 Surge current capacity 8/20 μ s	浪涌寿命 Surge life test	AC耐电压 AC withstanding voltage	UL规格认证产品 UL recognized		cUL规格认证产品 cUL recognized	EN规格认证产品 EN recognized
								UL497B File No. E175280	UL1449 File No. E318314	CSA C22.2No.269 UL File No. E318314	EN62368-1 TÜV Report No.J50164470
CDA70-701M	700V(560~840)	$\geq 100M\Omega$	DC250V	$\leq 0.6pF$	2,000A	8/20 μ s 100A 300times	—	○	○ 1)	○ 1)	—
CDA70-102M	1,000V(800~1,200)		DC500V				—	—	○ 1)	○ 1)	—
CDA70-272M	2,700V(2,160~3,240)						AC1,000V-1min AC1,200V-3s	—	○ 1)	○ 1)	—
CDA70-302M	3,000V(2,400~3,600)						AC1,500V-1min	—	○ 1)	○ 1)	○ 2)
CDA70-362M	3,600V(2,880~4,320)						AC1,800V-3s	—	○ 1)	○ 1)	○ 2)

- 1) 与压敏电阻 (AC125V : V1m $\geq$ A270V, D $\geq$ ϕ 7mm, AC250V : V1mA $\geq$ 470V, D $\geq$ ϕ 7mm) 电气串联即可被认证。
Approved if used with a varistor (125VAC : V1mA $\geq$ 270V, D $\geq$ ϕ 7mm, 250VAC : V1mA $\geq$ 470V, D $\geq$ ϕ 7mm) , electrically connected in series.
- 2) 与压敏电阻 (V1mA $\geq$ 470V, D $\geq$ ϕ 5mm) 电气串联即可被认证。
Approved if used with a varistor (V1mA $\geq$ 470V, D $\geq$ ϕ 5mm) , electrically connected in series.
- 3) 安全标准认定条件可能会被修订。关于最新的认定状况，请确认各标准的主页。
Safety standard certification conditions may be revised. Would you confirm the web site of each standard about the latest information.

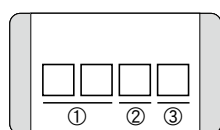
形状・尺寸 Dimensions



推荐焊盘布局 Recommended Land Pattern



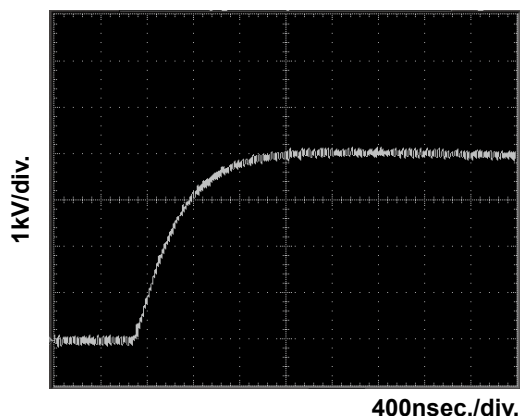
标记 Marking



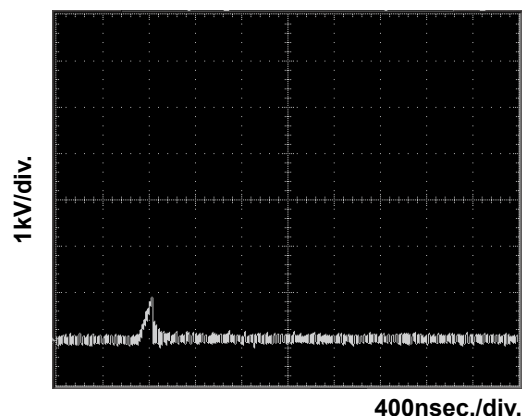
- ①: 型号略符 (最多两位数字)
Part number (Number with two digits maximum)
- ②: 生产月份
Production month
- ③: 生产年份
Production year

浪涌响应性(参考值) Surge response characteristics (Reference)

浪涌原波形 Original waveform
1.2/50μs 4kV



CDA70-701M 响应波形
CDA70-701M Response waveform



■ 焊接条件请参见第 94 页。 Please refer to page 94 for soldering conditions.

FA44 是具有高质响应性的浪涌防护元件，对应各种 AC 耐压试验，最适于要求浪涌耐受性的电源线的浪涌对策。

The FA44 responds very quickly to induced lightning and electrostatic discharges.

Capable of many types of AC withstand tests.

Ideal for protecting power supplies from power-line surge voltage.

特点

- 小型（直径 4.4mm 长度 7mm）
- 对应各种 AC 耐压试验
- 高质浪涌响应性，限制电压低
- 静电容量小，绝缘性优异
- 可稳定应对反复浪涌和环境变化
- 支持轴向编带和径向编带包装
- 无极性
- 无明暗之差
- 可以在各种电源电路上组合压敏电阻和 FA44 从而使用
- 使用温度范围（一般规格）：-40 ~ 85℃
- 保存温度范围（一般规格）：-55 ~ 125℃

Features

- Small size. (ϕ 4.4mm Length 7mm)
- Allows performing the AC withstand voltage test.
- Quick response for surge voltage, and low limiting voltage.
- Small capacitance and excellent insulation resistance.
- Stable for repeated discharge test conditions and environmental fluctuation.
- Axial and Radial taping available.
- No polarity.
- No dark effect.
- FA44 combined with varistor can be used as surge-protecting elements in power supplies.
- Operating temperature limit : -40 ~ 85℃
- Storage Temperature Range : -55 ~ 125℃

型号构成 Part number system

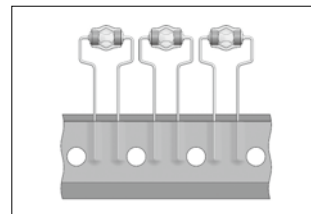
FA44 — 362 — A22F

系列名
Series

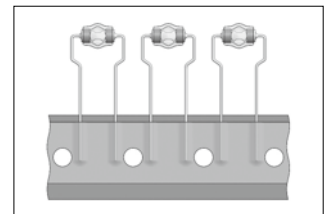
直流放电开始电压
(参考值)
DC Spark-over voltage
(Reference value)

包装形式
Packing form

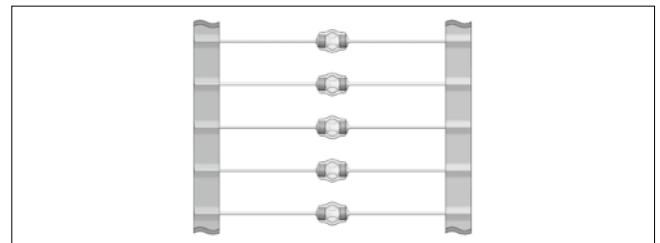
记号 Code	内容 Description
A22F	轴向（模型）编带、扁平包装 Axial, ammo pack taping
G04F	径向（模型）编带、扁平包装 Radial ammo pack (5.0mm width pitch) taping
H06F	径向（模型）编带、扁平包装 Radial ammo pack (7.5mm width pitch) taping



G04F (5.0mm 节距)
(5.0mm width pitch)



H06F (7.5mm 节距)
(7.5mm width pitch)



A22F

特性 Characteristics

型 号 Part number	脉冲 放电开始电压 Impulse sparkover voltage 1.2/50 μ s	绝缘阻抗 Insulation resistance IR	静电容量 Electrostatic capacitance 1kHz-6V max C	浪涌耐量 Surge current capacity 8/20 μ s	浪涌寿命 Surge life test	AC耐电压 AC withstand voltage	直流放电开始电压 ※参考值 DC sparkover voltage Vs ※Referenc value	UL规格认证产品 UL recognized UL1449 File No. E318314	cUL规格认证产品 cUL recognized CSA C22.2No.269 UL File No. E318314	EN规格认证产品 EN recognized EN62368-1 TÜV Report No. 50437982
FA44-272	4,500V max.	$\geq 100M\Omega$	$\leq 1pF$	2,000A	8/20 μ s 100A 300times	AC1,000V-1min AC1,200V-3s	2,700V (2,160~3,240)	○ 1) 4)	○ 1) 4)	—
FA44-302	5,000V max.					AC1,500V-1min	3,000V (2,400~3,600)	○ 1) 4)	○ 1) 4)	○ 2)
FA44-362	5,000V max.					AC1,800V-3s	3,600V (2,880~4,320)	○ 1) 4)	○ 1) 4)	○ 2)

1): 与压敏电阻 (AC125V : V1mA $\geq$ 270V, D $\geq$ ϕ 7mm, AC250V : V1mA $\geq$ 470V, D $\geq$ ϕ 7mm) 电气串联即可被认证。

: Approved if used with a varistor (125VAC : V1mA $\geq$ 270V, D $\geq$ ϕ 7mm, 250VAC : V1mA $\geq$ 470V, D $\geq$ ϕ 7mm), electrically connected in series.

2): 与压敏电阻 (V1mA $\geq$ 470V, D $\geq$ ϕ 5mm) 电气串联即可被认证。

: Approved if used with a varistor (V1mA $\geq$ 470V, D $\geq$ ϕ 5mm), electrically connected in series.

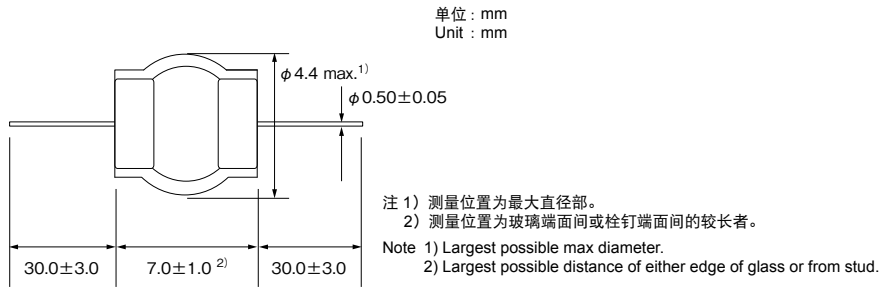
3): 安全标准认定条件可能会被修订。关于最新的认定状况，请确认各标准的主页。

: Safety standard certification conditions may be revised. Would you confirm the web site of each standard about the latest information.

4): 请向营业部咨询最新信息。

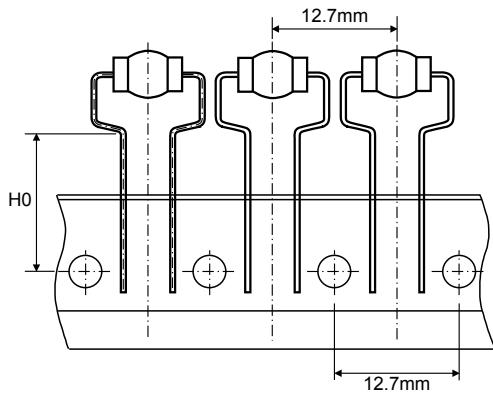
: Please contact to the sales department for the latest information.

形状・尺寸 Dimensions



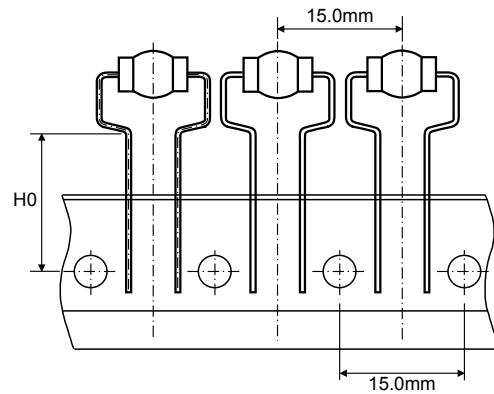
形状・尺寸 Dimensions

G04F Type



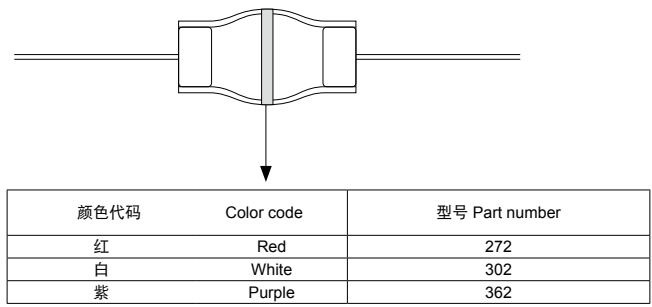
记号 Code	H0
G04F	17.0±1.0 mm

H06F H06G Type



记号 Code	H0
H06F	17.0±1.0 mm
H06G	19.0±1.0 mm

标记 Marking



FA55 是响应性较好的过电压保护元件。可应对各种 AC 耐电压试验，是需要较大浪涌耐量的电源线防浪涌的理想浪涌吸收元件。

The FA55 responds very quickly to induced lightning and electrostatic discharges.

Capable of many types of AC withstand tests.

Ideal for protecting power supplies from power-line surge voltage.

特点

- 结构极其小巧 (直径 5.5mm, 长度 7mm)
- 可适应各种 AC 耐电压试验
- 浪涌响应性好, 限制电压低
- 静电容量小, 绝缘性优异
- 可稳定应对反复浪涌及环境变化
- 可对应轴向编带及径向编带包装
- 无极性
- 无明显场所的特性差异
- FA55 可在各种电源电路中压敏电阻组合使用
- 使用温度范围 (一般规格): $-40 \sim 85^{\circ}\text{C}$
- 保存温度范围 (一般规格): $-55 \sim 125^{\circ}\text{C}$

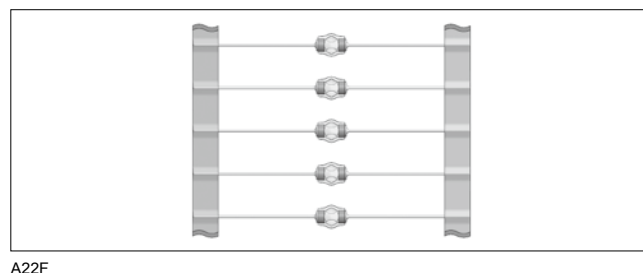
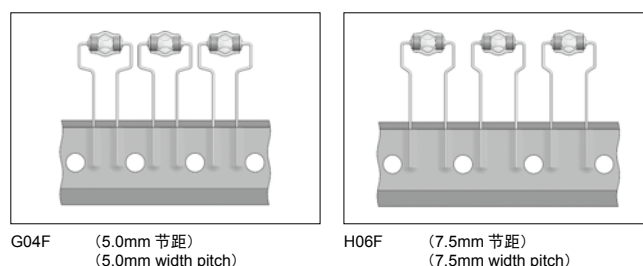
Features

- Small size. ($\phi 5.5\text{mm}$ Length 7mm)
- Allows performing the AC withstand voltage test.
- Quick response for surge voltage, and low limiting voltage.
- Small capacitance and excellent insulation resistance.
- Stable for repeated discharge test conditions and environmental fluctuation.
- Axial and Radial taping available.
- No polarity.
- No dark effect.
- FA55 combined with varistor can be used as surge-protecting elements in power supplies.
- Operating temperature limit: $-40 \sim 85^{\circ}\text{C}$
- Storage Temperature Range: $-55 \sim 85^{\circ}\text{C}$

型号构成 Part number system

系列名 Series	直流放电开始电压 (参考值) DC Spark-over voltage (Reference value)	包装形式 Packing form	标记 Marking
FA55	402	A22F	M

记号 Code	内容 Description
A22F	轴向 (横型) 编带、扁平包装 Axial, ammo pack taping
G04F	径向 (纵型) 编带、扁平包装 Radial ammo pack (5.0mm width pitch) taping
H06F	径向 (纵型) 编带、扁平包装 Radial ammo pack (7.5mm width pitch) taping



特性 Characteristics

型 号 Part number	脉冲 放电开始电压 Impulse sparkover voltage 1.2/50 μs	绝缘阻抗 Insulation resistance IR	静电容量 Electrostatic capacitance 1kHz-6V max C	浪涌耐量 Surge current capacity 8/20 μs	浪涌寿命 Surge life test	AC耐电压 AC withstand voltage	直流放电开始电压 ※参考值 DC sparkover voltage Vs ※Referenc value	UL规格认证产品 UL recognized	cUL规格认证产品 cUL recognized	EN规格认证产品 EN recognized
FA55-272	4,500V max.	$\geq 100\text{M}\Omega$	DC500V	$\leq 1\text{pF}$	8/20 μs 100A 300times	AC1,000V-1min AC1,200V-3s	2,700V (2,160~3,240)	○ 1)	○ 1)	—
FA55-302	5,000V max.					AC1,500V-1min	3,000V (2,400~3,600)	○ 1)	○ 1)	○ 2)
FA55-362	5,000V max.					AC1,800V-3s	3,600V (2,880~4,320)	○ 1)	○ 1)	○ 2)
FA55-402	6,000V max.					AC2,000V-1min	4,000V (3,200~4,800)	○ 1)	○ 1)	○ 2)

1): 与压敏电阻 (AC125V: $V1\text{mA} \geq 270\text{V}$, $D \geq \phi 7\text{mm}$, AC250V: $V1\text{mA} \geq 470\text{V}$, $D \geq \phi 7\text{mm}$) 电气串接 (导线绕焊、压接、焊接等) 即可被认证。

: Approved if used with a varistor (125VAC: $V1\text{mA} \geq 270\text{V}$, $D \geq \phi 7\text{mm}$, 250VAC: $V1\text{mA} \geq 470\text{V}$, $D \geq \phi 7\text{mm}$), electrically connected in series.

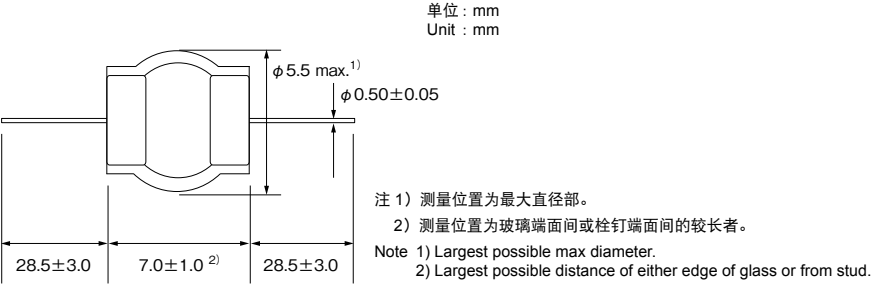
2): 与压敏电阻 ($V1\text{mA} \geq 470\text{V}$, $D \geq \phi 5\text{mm}$) 电气串接即可被认证。

: Approved if used with a varistor ($V1\text{mA} \geq 470\text{V}$, $D \geq \phi 5\text{mm}$), electrically connected in series.

3): 安全标准认定条件可能会被修订。关于最新的认定状况, 请确认各标准的主页。

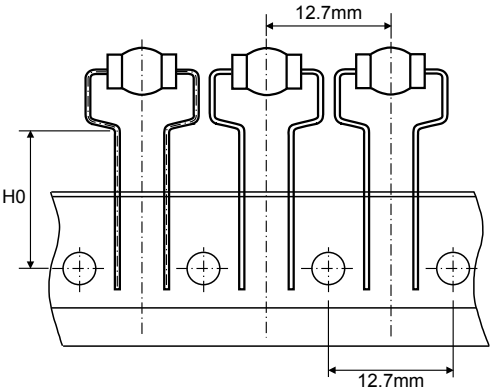
: Safety standard certification conditions may be revised. Would you confirm the web site of each standard about the latest information.

形状・尺寸 Dimensions



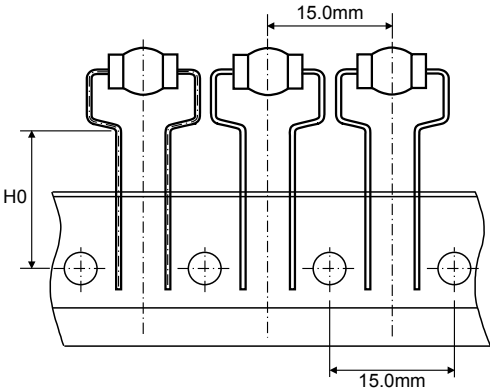
形状・尺寸 Dimensions

G04F Type



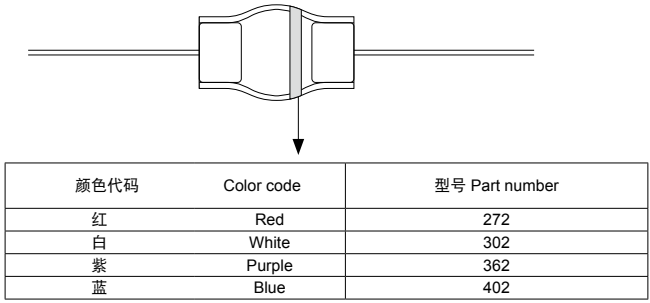
记号 Code	H0
G04F	16.0 ± 2.0 mm

H06F Type



记号 Code	H0
H06F	16.0 ± 2.0 mm

标记 Marking



DA53 是利用微隙进行电场放电的浪涌保护元件。浪涌响应性好，可适应各种 AC 耐电压试验，是需要较大浪涌耐量的电源线防浪涌的理想浪涌吸收元件。

The DA53 has a micro-gap cut to an accuracy of several tens of microns for rapid response against induced lightning and electrostatic discharges. Ideal for protecting power supplies from power-line surge voltage.

特点

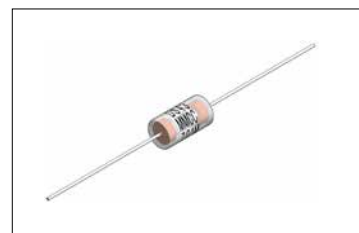
- 结构极其小巧(直径5.3mm，长度10mm)
- 可适应各种AC耐电压试验
- 浪涌耐量大、3000A
- 浪涌响应性好，限制电压低
- 静电容量小，绝缘性优异
- 可稳定应对反复浪涌及环境变化
- 无极性
- 无明显场所的特性差异
- DA53系列可在各种电源电路中与压敏电阻组合使用
- 使用温度范围（一般规格）：-40～125℃
- 保存温度范围（一般规格）：-55～125℃

Features

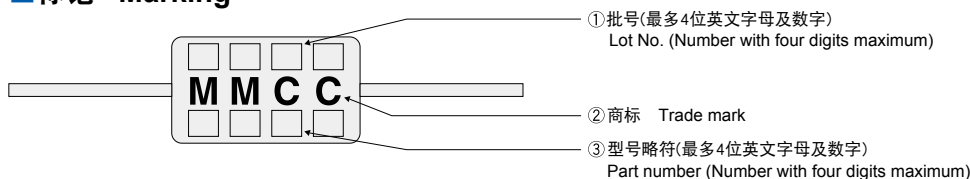
- Small size. (φ5.3mm 10mm length)
- Capable of many types of AC withstand tests.
- Used to protect power supplies.
- Quick response for surge voltage and low limiting voltage.
- Small capacitance and excellent insulation resistance.
- Stable for repeated discharge test conditions and environmental fluctuation.
- No polarity.
- No dark effect.
- DA53 series surge absorber in series with a varistor used for surge protection in many types of power supplies.
- Operating temperature limit : -40 ~ 125℃
- Storage Temperature Range : -55 ~ 125℃

型号构成 Part number system

DA53	—	622	M	F — E15E
系列名 Series		直流放电开始电压 (Vs) DC Spark-over voltage (Vs)	直流放电开始电压容许偏差 DC Spark-over voltage tolerance	编带形式 Taping form
		前2位数字表示电压值的有效数字， 第3位数字表示乘幂。 The first two digits are significant, and the third is number of zeros. 例) 622 的表示 Ex) 622 means: 62 × 10 ² = 6200v	M ±20%	B 散装 Bulk pack F-E15E 成型形状 (导线间距15mm)、散装 Lead pitch 15mm, Bulk pack F-E25E 成型形状 (导线间距25mm)、散装 Lead pitch 25mm, Bulk pack T-A22F 轴向 (卧式) 编带、扁平带装 Axial, ammo pack taping



标记 Marking

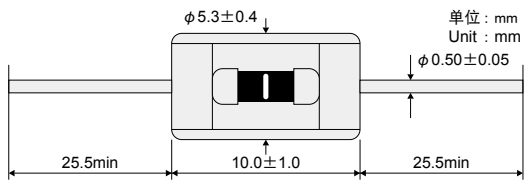


特性 Characteristics

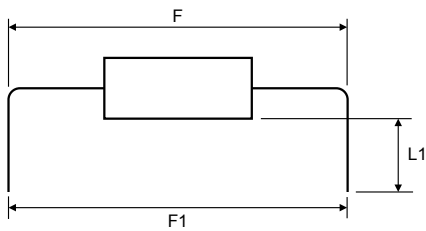
型号 Part number	直流放电开始电压 DC spark-over voltage Vs	绝缘阻抗 Insulation resistance IR	静电容量 Electrostatic capacity 1kHz-6V max C	浪涌耐量 Surge current capacity 8/20 μs	浪涌寿命 Surge life test	AC耐电压 AC withstanding voltage	UL规格认证产品 UL recognized UL1449 File No. E318314	CSA规格认证产品 CSA recognized C22.2 No.269.5-17 File No. 111411	EN规格认证产品 EN recognized EN62368-1 TUV ReportNo.J9851289 (DA53-752M,782M), J9850855 (DA53-302M,362M,452M,622M)
NEW DA53-351M	350V(280~420)	≥100MΩ	≤1pF	3,000A	8/20 μs 100A 300times	—	○ 1)	—	—
DA53-501M	500V(400~600)						—	—	—
DA53-701M	700V(560~840)						○ 1)	—	—
DA53-272M	2,700V(2,160~3,240)						AC1,000V-1min AC1,200V-3s	○ 1)	—
DA53-302M	3,000V(2,400~3,600)						AC1,500V-1min	○ 1)	○ 2)
DA53-362M	3,600V(2,880~4,320)						AC1,800V-3s	○ 1)	○ 2)
NEW DA53-452M	4,500V(3,600~5,400)						AC2,000V-1min	○ 1)	○ 2)
DA53-622M	6,200V(4,960~7,440)						AC3,000V-3s	—	○ 2)
DA53-752M	7,500V(6,000~9,000)						AC3,600V-3s	—	○ 2)
DA53-782M	7,800V(6,240~9,360)						AC4,000V-1min	—	○ 2)

- 1) : 与压敏电阻 (AC125V : V1mA ≥ 270V, D ≥ φ 5mm, AC250V : V1mA ≥ 470V, D ≥ φ 5mm) 电气串接即可被认证。
: Approved if used with a varistor (125VAC : V1mA ≥ 270V, φ ≥ 5mm ; 250VAC : V1mA ≥ 470V, φ ≥ 5mm) electrically connected in series.
- 2) : 与压敏电阻 (V1mA ≥ 470V, D ≥ φ 5mm) 电气串接即可被认证。
: Approved if used with a varistor (V1mA ≥ 470V, φ ≥ 5mm) electrically connected in series.
- 3) : 安全标准认定条件可能会被修订。关于最新的认定状况，请确认各标准的主页。
: Safety standard certification conditions may be revised. Would you confirm the web site of each standard about the latest information.

形状・尺寸 Dimensions



成形状态
Forming form



形状 Forming : E15E

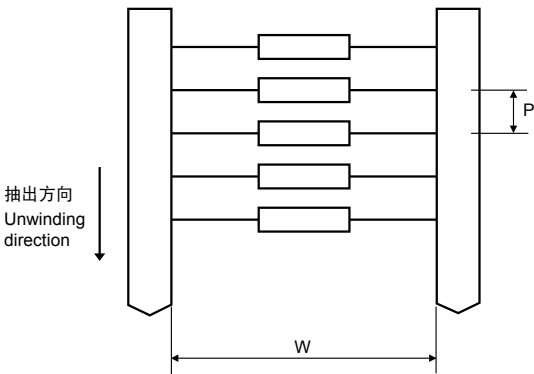
记号	Symbol	尺寸	Dimension (mm)
F		15.0 ± 1.0	
F1 ¹⁾		15.0 (参考值 reference)	
L1 ²⁾		5.0 ± 1.0	

- 1) 测量位置为导线端面。
2) 测量位置为玻璃下面以及导线端面。
1) The measurement position is at the tip of the lead wire.
2) The measurement position is the lower surface of the glass and the tip of the lead wire.

形状 Forming : E25E

记号	Symbol	尺寸	Dimension (mm)
F		25.0 ± 1.0	
F1 ¹⁾		25.0 (参考值 reference)	
L1 ²⁾		5.0 ± 1.0	

形状 Forming : A22F



记号	Symbol	尺寸	Dimension (mm)
P		10.0 ± 0.5	
W		52.0 +2.0/-1.0	

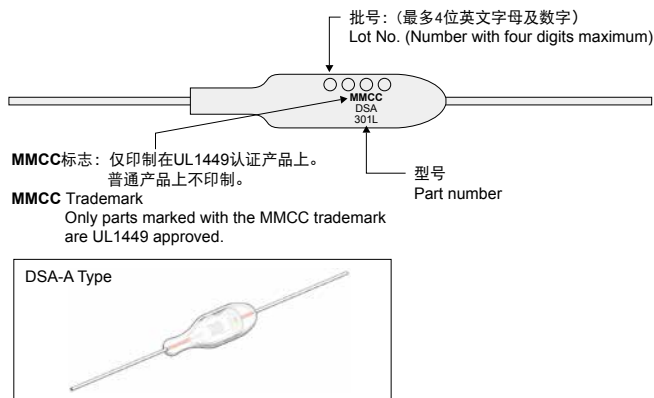
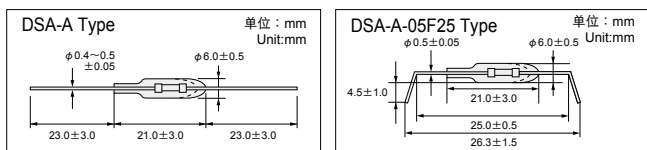
特点

- 可广泛用于通信设备、传感线路等低电压低电流电路
- 静电容量小，可用于信号线
- DSA-A型可在各种电源电路中 与压敏电阻或指定的陶瓷电阻组合使用
- 在电源电路中，无需拆下浪涌吸收器即可进行AC耐压试验(2,400V以上)
- DSA-A型与UL认证压敏电阻或指定的陶瓷电阻(RGBS5L-3WK)组合后，可作为UL规格认证产品使用。(UL1449文件号E318314)
- ★部分型号已获得CSA、TÜV 认证。详情请垂询本公司。
- 使用温度范围（一般规格）：-40 ~ 125℃
- 保存温度范围（一般规格）：-55 ~ 125℃

型号构成 Part number system

DSA	—	242	M	A — 05 F25	(UL)
系列名 Series		直流放电开始电压 (Vs) DC Spark-over voltage (Vs)	直流放电开始电压容许偏差 DC Spark-over voltage tolerance	包装形式 Packing form	UL1449 认证产品记号 UL1449 Recognized
		前2位数字表示电压值的有效数字， 第3位数字表示乘幂。 The first two digits are significant, and the third is number of zeros. 例) 242表示 $24 \times 10^2 = 2400V$ Example Assume the designation is 242. This means that the spark-over voltage is: $24 \times 10^2 = 2400V$	L ±15% M ±20%	A 导线直径 φ0.4mm、散装 Lead wire diameter φ0.4, Bulk pack A-05 导线直径 φ0.5mm、散装 Lead wire diameter φ0.5, Bulk pack A-05F25 成型形状、导线直径 φ0.5mm、散装 Bulk forming, Lead wire diameter φ0.5, Bulk pack	(UL) UL 认证产品 UL Recognized 无 非UL认证产品 UL Not recognized

形状・尺寸 Dimensions



特性 Characteristics

型号 Part number	直流放电开始电压 DC spark-over voltage Vs	绝缘阻抗 Insulation resistance IR	静电容量 Electrostatic capacitance 1kHz-6V max C	浪涌耐量 Surge current capacity 8/20 μs	浪涌寿命 Surge life test	AC耐电压 AC withstanding voltage	UL规格认证产品 UL recognized		CSA规格认证产品 CSA recognized	EN规格认证产品 EN recognized
							UL1449 File No. E318314	UL497B File No. E175280		
DSA-301LA	300V(255~345)	≥100MΩ	DC100V	导线直径 Lead wire diameter φ0.4mm : 1500A	8/20 μs 100A 300time	—	○ 1)	○	—	—
DSA-501MA	500V(400~600)					—	○ 1)	○	—	—
DSA-701MA	700V(560~840)					—	○ 1)	○	—	—
DSA-102MA	1,000V(800~1,200)					—	○ 1)	—	—	—
DSA-152MA	1,500V(1,200~1,800)					—	○ 1)	—	—	—
DSA-242MA	2,400V(1,920~2,880)					—	○ 1)	—	—	—
DSA-282MA	2,800V(2,240~3,360)					AC1,000V-1min AC1,200V-3s	○ 1)	—	○ 2)	—
DSA-302MA	3,000V(2,400~3,600)					AC1,000V-1min AC1,250V-3s	○ 1)	—	○ 2)	—
DSA-332MA	3,300V(2,640~3,960)					AC1,500V-1min	○ 1)	—	○ 2)	○ 3)
DSA-362MA	3,600V(2,880~4,320)					AC1,800V-3s	○ 1)	—	○ 2)	○ 3)
DSA-402MA	4,000V(3,200~4,800)	DC500V	≤2pF	φ0.5mm : 2000A		AC2,000V-1min	○ 1)	—	○ 2)	○ 3)
DSA-452MA	4,500V(3,600~5,400)					AC2,000V-1min	○ 1)	—	○ 2)	○ 3)
DSA-622MA	6,200V(4,960~7,440)					AC3,000V-3s	—	—	○ 2)	○ 3)
DSA-752MA	7,500V(6,000~9,000)					AC3,600V-3s	—	—	○ 2)	○ 3)

- 1) : 与本公司指定的陶瓷电阻 (AC125 RGBS5L-3QK) 或者压敏电阻 (AC125V : V1mA ≥ 270V, D ≥ φ 5mm, AC250V : V1mA ≥ 470V, D ≥ φ 5mm) 电气串联即可被认证。
: Approved if used with a varistor (125VAC : RGBS5L-3QK) or a varistor (125VAC : V1mA ≥ 270V, D ≥ φ 5mm ; 250VAC : V1mA ≥ 470V, D ≥ φ 5mm) electrically connected in series.
- 2) : 与压敏电阻 (AC125V : V1mA ≥ 270V, D ≥ φ 5mm, AC250V : V1mA ≥ 470V, D ≥ φ 5mm) 电气串联即可被认证。
: Approved if used with a varistor (125VAC : V1mA ≥ 270V, D ≥ φ 5mm, 250VAC : V1mA ≥ 470V, D ≥ φ 5mm), electrically connected in series.
- 3) : 与压敏电阻 (V1mA ≥ 470V, D ≥ φ 10mm) 电气串联即可被认证。
: Approved if used with a varistor (V1mA ≥ 470V, D ≥ φ 10mm), electrically connected in series.
- 4) : 安全标准认定条件可能会被修订。关于最新的认定状况，请确认各标准的主页。
: Safety standard certification conditions may be revised. Would you confirm the web site of each standard about the latest information.

特点

- 需要大浪涌耐受性的工业用设备基板安装型浪涌对策部件
- 浪涌破坏耐受性：
- 支持额定电压AC125V/AC250V
- 1台即可支持电源线间的浪涌对策
- 面对雷电电涌，会迅速工作，保护设备
- 可有效抵御反复电涌，寿命较长
- 使用温度范围（一般规格）：-25~85℃
- 保存温度范围（一般规格）：-40~125℃

用途

- 自动贩卖机、OA设备、测量设备
- 通用变频器、NC控制设备、各种机床
- 太阳能发电用功率调节器、LED室外照明

型号构成 Part number system

EAZR	1	A	—	301
系列名 Series	对应电源 Corresponding power supply	浪涌耐量 Surge current capacity	—	使用放电管（参考） Inside discharge tube
1	AC125V线间及线-GND间 Between AC125V lines or between AC125V lines and ground	A	—	301 300V±20% 501 500V±20%
2	AC250V线间及线-GND间 Between AC250V lines or between AC250V lines and ground			
		A		浪涌破坏耐受性：5kA 浪涌特性耐受性：2kA Surge current capacity : 5kA Surge current characteristic capacity : 2kA
		B		浪涌破坏耐受性：10kA 浪涌特性耐受性：5kA Surge current capacity : 10kA Surge current characteristic capacity : 5kA



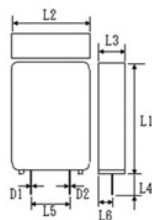
特性 Characteristics

额定电压 Rated voltage	型号 Part number	最大连续使用电压 Maximum continuous operating voltage	绝缘电阻 Insulation resistance IR		静电容量 Electrostatic capacitance 1kHz-6V max C	浪涌破坏耐受性 Surge current characteristic capacity	浪涌破坏耐受性 Surge current capacity	浪涌寿命 Surge life test	电压保护标准 Voltage protection level 1)	UL标准认定品 UL recognized	cUL标准认定品 cUL recognized
										UL 1449 FileNo.E318314	CSA C22.2 No.269 FileNo.E318314
AC125V	EAZR 1A-301	AC150V	≥100MΩ	DC100V	≤2pF	2kA(8/20 μs)	5kA(8/20 μs)	8/20 μs 100A 300times	1.2kV	○	○
AC125V	EAZR 1B-301			DC100V		5kA(8/20 μs)	10kA(8/20 μs)		1.5kV	○	○
AC250V	EAZR 2A-501	AC250V		DC250V		2kA(8/20 μs)	5kA(8/20 μs)		1.8kV	○	○
AC250V	EAZR 2B-501			DC250V		5kA(8/20 μs)	10kA(8/20 μs)		2.5kV	○	○

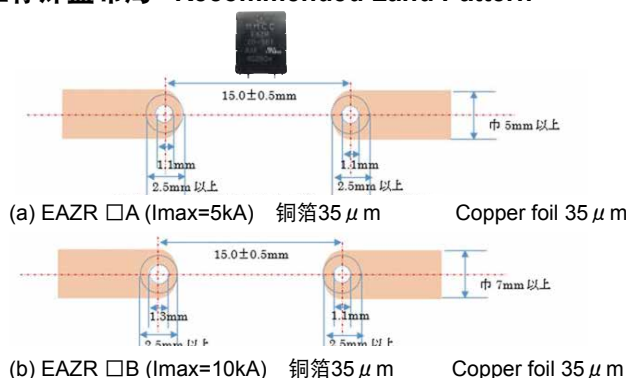
- 1)：施加浪涌特性耐受性（8/20 μs）时
Surge current characteristic capacity : 8/20 μs
- 2)：安全标准认定条件可能会被修订。关于最新的认定状况，请确认各标准的主页。
Safety standard certification conditions may be revised. Would you confirm the web site of each standard about the latest information.

形状·尺寸 Dimensions

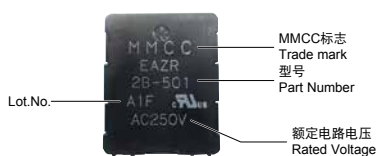
记号 Symbol	尺寸(mm) Dimensions
D1	φ0.80+0.08/-0.05
D2	φ0.80+0.08/-0.05 φ1.00+0.10/-0.05
L1	33.5±0.3
L2	27±0.2
L3	11±0.5
L4	6.0±1.0
L5	15.0±0.5
L6	5.5(参考值) Reference Value



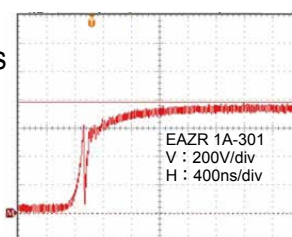
推荐焊盘布局 Recommended Land Pattern



表示 Display



浪涌响应性(参考值) Surge response Characteristics (Reference value)

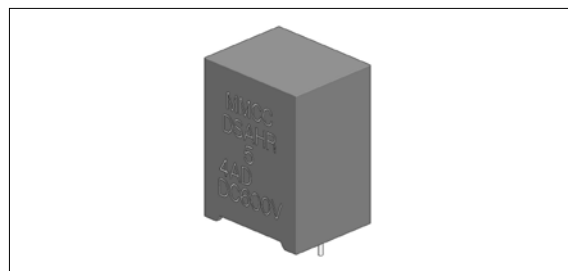


特点

- 用于需要较大浪涌耐量的电路的防浪涌
- 使用温度范围（一般规格）：-25~65℃
- 保存温度范围（一般规格）：-25~85℃

Features

- Used to protect power supplies.
- Operating temperature limit: -25~65℃
- Storage Temperature Range: -25~85℃

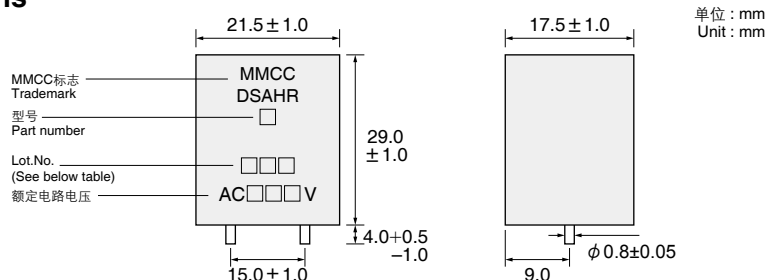


型号构成 Part number system

DSAHR - 1
系列名 Series 略符 Abbreviation

1	用于AC 125V电源线之间或电源线与接地之间 Between AC125V lines or between AC125 lines and ground	4	用于DC 450V电源线之间或电源线与接地之间 Between DC450V lines or between AC125 lines and ground
3	用于AC 250V电源线之间或电源线与接地之间 Between AC250V lines or between AC250 lines and ground	5	用于DC 600V电源线之间或电源线与接地之间 Between DC600V lines or between AC250 lines and ground

形状・尺寸 Dimensions



特性 Characteristics

额定电压 Rated voltage	型 号 Part number	直流放电开始电压 DC spark-over voltage Vs	绝缘阻抗 Insulation resistance IR	静电容量 Electrostatic capacitance 1kHz-6V max.	浪涌耐量 Surge current capacity 8/20μsec.	浪涌寿命 Surge life test	UL规格认证产品 UL approved UL 1449 File No. E318314
AC125V	DSAHR-1	500V(400~600)	≥ 100MΩ	DC100V	5,000A	8/20 μ s. 100A 300times	○
AC250V	DSAHR-3	800V(640~960)		DC250V			○
DC450V	DSAHR-4	1,200V(960~1,440)		DC450V			○
DC600V	DSAHR-5	1,500V(1,200~1,800)		DC600V			○

1) : 安全标准认定条件可能会被修订。关于最新的认定状况, 请确认各标准的主页。

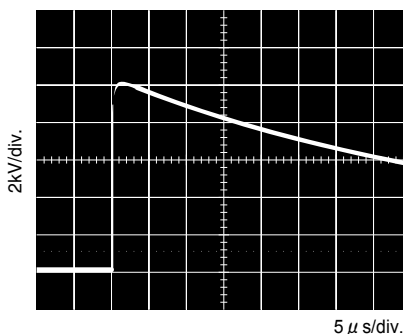
: Safety standard certification conditions may be revised. Would you confirm the web site of each standard about the latest information.

DSAZR, DSANR, DSAHR, EAZR 批号表示方法 Lot No. system

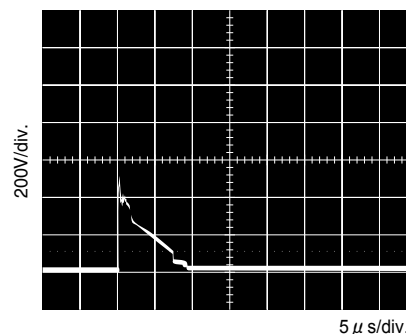
批号表示方法		Lot No. system																											
印记: 白色 Marking color:white (DSAZR:gray)																													
批号左起第1个字符: 表示生产地点的英文字母 Lot No. first character:factory																													
批号左起第2个字符: 生产年份的最后1位 Lot No. second character:manufactured year(Last one digit)																													
批号左起第3个字符: 生产月份 (参见下表) Lot No. third character:manufactuerd month(See table below)																													
<table><tr><td>月份 month</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td></tr><tr><td>略符 Code</td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td><td>G</td><td>H</td><td>J</td><td>K</td><td>L</td><td>M</td></tr></table>				月份 month	1	2	3	4	5	6	7	8	9	10	11	12	略符 Code	A	B	C	D	E	F	G	H	J	K	L	M
月份 month	1	2	3	4	5	6	7	8	9	10	11	12																	
略符 Code	A	B	C	D	E	F	G	H	J	K	L	M																	
例: E5D 2005年4月生产 Example:E5D manufactuerd April,2005																													

DSA系统的浪涌响应特性(参考值) Surge response characteristics of DSA series(Reference)

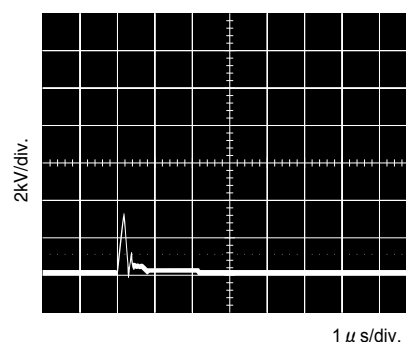
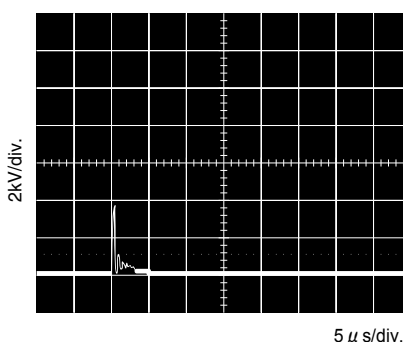
浪涌原波形 Original waveform
1.2/50μs 10kV



DSA-301LA 响应波形 Response waveform



DSA-242MA 响应波形 Response waveform



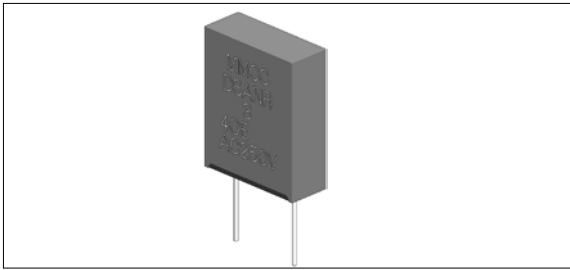
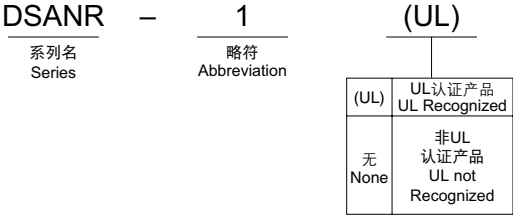
特点

- 可在各种电源电路中使用
- 部分型号已获得UL、TÜV认证
- 使用温度范围（一般规格）：-25~85℃
- 保存温度范围（一般规格）：-40~125℃

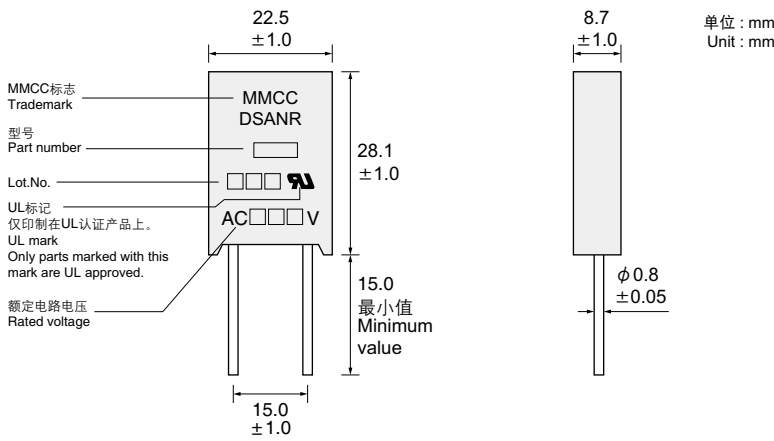
Features

- Used to protect power supplies.
- Some models are recognized by UL, TÜV.
- Operating temperature limit: -25~85℃
- Storage Temperature Range: -40~125℃

型号构成 Part number system



形状・尺寸Dimensions



特性 Characteristics

额定电压 Rated voltage	型 号 Part number	直流放电开始电压 DC spark-over voltage Vs	绝缘电阻 Insulation resistance IR		静电容量 Electrostatic capacitance 1kHz-6V max C	浪涌耐量 Surge current capacity 8/20 μ s	浪涌寿命 Surge life test	AC耐电压 AC Withstanding voltage	UL标准认定品 UL recognized	EN认证 EN recognized
									UL1449 File No. E318314	EN62368-1 TÜV Report No. J9251508
AC125V	DSANR-1	500V (400~600)	≥100MΩ	DC100V	≤2pF	1,000A	8/20 μ s 100A 300times	—	○	—
	DSANR-2	600V (480~720)		DC250V				—	○	—
	DSANR-2A	800V (640~960)						—	—	—
	DSANR-2B	1,100V (880~1,320)		DC500V				—	—	—
	DSANR-4	2,400V (1,920~2,880)						AC1,000V-1min AC1,200V-3s	○	—
	DSANR-6	3,600V (2,880~4,320)						AC1,800V-3s	—	—
AC250V	DSANR-3	800V (640~960)		DC250V				—	○	—
	DSANR-3A	1,400V (1,120~1,680)		DC500V				—	—	—
	DSANR-5	3,000V (2,400~3,600)						AC1,500V-1min	○	○
	DSANR-6A	3,600V (2,880~4,320)						AC1,800V-3s	—	○
	DSANR-9	4,000V (3,200~4,800)						AC2,000V-1min	—	○
	DSANR-10B	4,500V (3,600~5,400)						AC2,000V-1min	—	○

1)：安全标准认定条件可能会被修订。关于最新的认定状况，请确认各标准的主页。
： Safety standard certification conditions may be revised. Would you confirm the web site of each standard about the latest information.

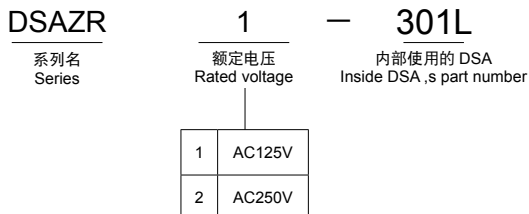
特点

- 可在各种电源电路中使用
- 可用于电视机天线输入电路的浪浪涌
- 部分型号已获得UL、CSA、TÜV认证
- 使用温度范围（一般规格）：-25～85℃
- 保存温度范围（一般规格）：-40～125℃

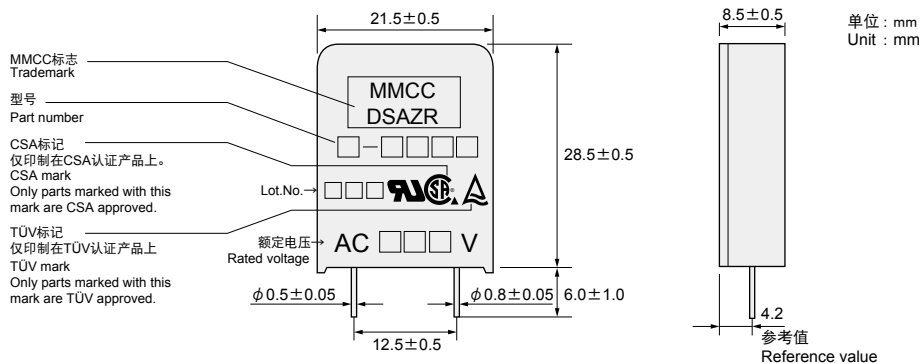
Features

- Used to protect power supplies.
- Excellent for protecting TV-tuner circuits.
- Some models are recognized by UL, CSA and TÜV.
- Operating temperature limit: -25~85℃
- Storage Temperature Range: -40~125℃

型号构成 Part number system



形状・尺寸 Dimensions



特性 Characteristics

额定电压 Rated voltage	型 号 Part number	直流放电开始电压 DC spark-over voltage Vs	绝缘电阻 Insulation resistance IR	静电容量 Electrostatic capacitance 1kHz-6V max C	浪涌耐量 Surge current capacity 8/20 μs	浪涌寿命 Surge life test	AC耐电压 AC Withstanding voltage	UL标准认定品 UL recognized UL1449 File No. E318314	CSA认证 CSA recognized C22.2 No. 269.4-17 File No. 87070	EN认证 EN recognized EN62368-1 TÜV Report No. J9251508
AC125V	DSAZR1-301L	500V (400~600)	≥100MΩ	≤2pF	1,000A	8/20 μs 100A 300times	—	○	—	—
	DSAZR1-501M	600V (480~720)					—	○	—	—
	DSAZR1-102M	1,100V (880~1,320)					—	—	—	—
	DSAZR1-242M	2,400V (1,920~2,880)					AC1,000V-1min AC1,200V-3s	○	○	—
	DSAZR1-282M	2,800V (2,240~3,360)					AC1,250V-3s	—	○	—
	DSAZR1-302M	3,000V (2,400~3,600)					AC1,500V-1min	○	○	—
	DSAZR1-362M	3,600V (2,880~4,320)					AC1,800V-3s	○	○	—
	DSAZR1-402M	4,000V (3,200~4,800)					AC2,000V-1min	○	○	—
	DSAZR1-452M	4,500V (3,600~5,400)					AC2,000V-1min	○	○	—
AC250V	DSAZR2-501M	800V (640~960)	≥100MΩ	≤2pF	1,000A	8/20 μs 100A 300times	—	○	—	—
	DSAZR2-102M	1,400V (1,120~1,680)					—	—	—	—
	DSAZR2-242M	2,400V (1,920~2,880)					AC1,000V-1min AC1,200V-3s	○	—	—
	DSAZR2-302M	3,000V (2,400~3,600)					AC1,500V-1min	○	○	○
	DSAZR2-362M	3,600V (2,880~4,320)					AC1,800V-3s	○	○	○
	DSAZR2-402M	4,000V (3,200~4,800)					AC2,000V-1min	○	○	○
	DSAZR2-452M	4,500V (3,600~5,400)					AC2,000V-1min	○	○	○

1): 安全标准认定条件可能会被修订。关于最新的认定状况, 请确认各标准的主页。
: Safety standard certification conditions may be revised. Would you confirm the web site of each standard about the latest information.

DE37 是符合 5mm 引脚间距插装的电源线、通信线路用浪涌吸收器。该系列结构小巧，浪涌耐量达 1500A(8/20 μ sec.)，动作电压范围为 300~4500V。其中 400V 的产品符合 ADSL POTS* 分路器用规格：ITU-T(国际电信联盟 试验规格) K.20 或 K.21 的 Basic Test Condition(基本试验条件)，被日本国内许多用户用于局用或家用 ADSL 分路器，并获得一致好评。

※POTS : Plain Old Telephone Service

特点

- 采用 5mm 引脚间距的径向编带形状，适合自动插装（元件高度控制在 15.5mm 以下）（2700V 以上的品种除外）
- 可选用轴向编带（玻璃放电管平放时也可实现自动插装）
- 1pF 以下的低静电容量，不会阻碍兆位级的高速通信信号
- 采用微隙方式，具有优异的浪涌响应效果
- 具有 100M Ω 以上的高绝缘阻抗特性
- 使用温度范围（一般规格）：-40 ~ 85℃
- 保存温度范围（一般规格）：-55 ~ 125℃

型号构成 Part number system

DE37

系列名
Series

401

直流放电开始电压 (Vs)
DC Spark-over
voltage(Vs)

前2位数字表示电压值的有效数字，
第3位数字表示乘数。
The first two digits are significant,
and the third is number of zeros.

例) 401表示:
40 $\times 10^1$ = 400v
Ex) 401 means:
40 $\times 10^1$ = 400v

W

直流放电开始电压容许偏差
DC Spark-over
voltage tolerance

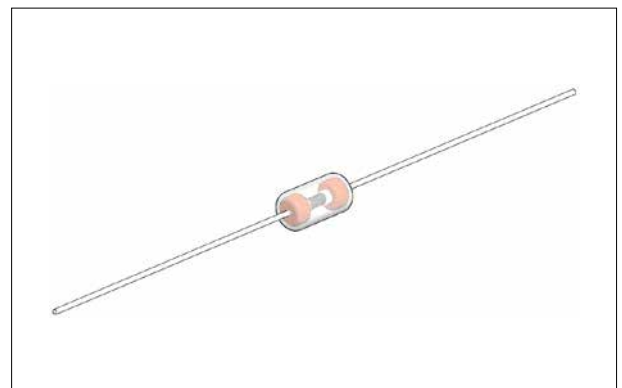
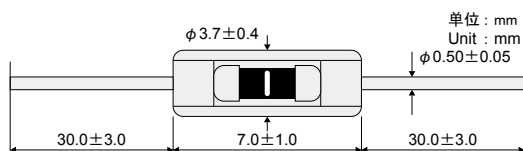
L	$\pm 15\%$
M	$\pm 20\%$
W	+20% -15%

S00B

包装形式
Packing form

A12F	轴向编带（带宽26mm）、扁平包装 Axial taping (taping width 26mm), ammo pack taping
A21F	轴向编带（带宽幅52mm）、扁平包装 Axial taping (taping width 52mm), ammo pack taping
A22F	轴向编带（带宽幅52mm）、扁平包装 Axial taping (taping width 52mm), ammo pack taping
D04F	径向编带、扁平包装 Radial ammo pack (5.0mm width pitch) taping
G04F	径向编带、扁平包装 Radial ammo pack (5.0mm width pitch) taping
G04G	径向编带、扁平包装 Radial ammo pack (5.0mm width pitch) taping
H06F	径向编带、扁平包装 Radial ammo pack (7.5mm width pitch) taping
H06G	径向编带、扁平包装 Radial ammo pack (7.5mm width pitch) taping
H06K	径向编带、扁平包装 Radial ammo pack (7.5mm width pitch) taping
S00B	散装 Bulk pack

形状·尺寸 Dimensions



The DE37 surge absorbers have a 5mm pitch and are ideal for power lines and communication networks. This compact device can handle surges of up to 1500A(8/20 μ s) and is available in several voltages ranging from 300V to 4500V. The 400V part meets the standard for ADSL POTS* splitters: ITU-T(International Telecommunication Union test standard) K.20 and K.21 Basic Test Condition, and has already received good response from both service providers and home users in ADSL splitters.

Features

- The 5mm pitch; radial taped parts can be mounted using automatic insertion equipment (the part is lower than 15.5mm). (except the item of over 2700V)
- Also available in axial taping (the glass tube can be mounted flat using automatic insertion equipment).
- Can be used on megabit class high speed without attenuation of signal due a capacitance value of less than 1pF.
- Superior surge response characteristics due to microgap technology.
- High insulation resistance of over 100M Ω .
- Operating temperature limit : -40 ~ 85℃
- Storage Temperature Range : -55 ~ 125℃

■特性 Characteristics

型 号 Part number	直流放电开始电压 DC spark-over voltage Vs	绝缘阻抗 Insulation resistance IR		静电容量 Electrostatic capacitance 1kHz-6V max C	浪涌耐量 Surge current capacity 8/20 μ s	浪涌寿命 Surge life test	AC耐电压 AC withstanding voltage	UL规格认证产品 UL recognized		cUL规格认证产品 cUL recognized	EN规格认证产品 EN recognized
								UL 497B File No. E175280	UL1449 File No. E318314	CSA C22.2No.269 UL File No. E318314	EN62368-1 TÜV. Report No. J50164439
DE37-301L	300V (255~345)	≥100MΩ	DC 100V	≤1pF	1,500A	8/20 μ s 100A 300times	—	○	—	—	—
DE37-351M	350V (280~420)		DC 250V				—	○	—	—	—
DE37-401W	400V (340~480)						—	○	—	—	—
DE37-501M	500V (400~600)						—	○	—	—	—
DE37-102M	1,000V (800~1,200)						DC 500V	—	—	—	—
DE37-272M	2,700V (2,160~3,240)		AC1,000V-1min AC1,200V-3s			—		○ 1)	○ 1)	—	
DE37-302M	3,000V (2,400~3,600)		AC1,500V-1min			—		○ 2)	○ 2)	○ 3)	
DE37-362M	3,600V (2,880~4,320)		AC1,800V-3s			—		○ 2)	○ 2)	○ 3)	
DE37-452M	4,500V (3,600~5,400)		DC 1,000V			AC2,000V-1min		—	○ 2)	○ 2)	○ 3)

- 1) : 若与压敏电阻 (AC125V : $V1mA \geq 270V$, $D \geq \phi 5mm$) 电气串联即被认可。
: Approved if used with a varistor (125VAC : $V1mA \geq 270V$, $\phi \geq 5mm$) electrically connected in series.
- 2) : 若与压敏电阻 (AC125V : $V1mA \geq 270V$, $D \geq \phi 5mm$, AC250V : $V1mA \geq 470V$, $D \geq \phi 5mm$) 电气串联即被认可。
: Approved if used with a varistor (125VAC : $V1mA \geq 270V$, $\phi \geq 5mm$; 250VAC : $V1mA \geq 470V$, $\phi \geq 5mm$) electrically connected in series.
- 3) : 若与压敏电阻 ($V1mA \geq 470V$, $D \geq \phi 5mm$) 电气串联即被认可。
: Approved if used with a varistor ($V1mA \geq 470V$, $\phi \geq 5mm$) electrically connected in series.
- 4) : 安全标准认定条件可能会被修订。关于最新的认定状况, 请确认各标准的主页。
: Safety standard certification conditions may be revised. Would you confirm the web site of each standard about the latest information.

■ITU-T K.20 Basic Test Condition(基本试验条件)

- 浪涌试验
10/700 μ s 1.5kV/4kV (25 Ω) ± 5 次
- AC感应试验
AC600V (600 Ω) 1秒 5次
- AC交叉试验
AC230V (10~1000 Ω) 15分
但外加AC230V时, DE37-401W未响应。

■Basic Conditions for ITU-T K.20

- Surge Test : 10/700 μ s, 1.5kV/4kV (25 Ω), 5 times.
- AC Induced Test : AC600V (600 Ω), 1sec., 5 times.
- AC Cross Test : AC230V (10~1000 Ω), 15min.
(however, AC230V is too low for the DE37-401W to react)



■特点

- 用于电话机、调制解调器、传真机等电话线路连接设备的防浪涌
- 用于电脑等通信线路连接设备的防浪涌
- 部分型号已获得UL规格认证
- 使用温度范围（一般规格）：-40～85℃
- 保存温度范围（一般规格）：-55～125℃

■Features

- Surge protection for telephone lines.(telephone, modem, facsimile etc.)
- Surge protection for telecommunication lines.(computer etc.)
- Some models are recognized by UL.
- Operating temperature limit : -40～85℃
- Storage Temperature Range : -55～125℃

■型号构成 Part number system

DSS

系列名
Series

—

301

直流放电开始电压 (Vs)
DC Spark-over
voltage(Vs)

前2位数字表示电压值的有效数字，
第3位数字表示乘幂。
The first two digits are significant,
and the third is number of zeros.
例) 301表示:
30 × 10¹=300v
Ex) 301 means:
30 × 10¹=300v

—

L

直流放电开始电压容许偏差
DC Spark-over
voltage tolerance

L	±15%
M	±20%

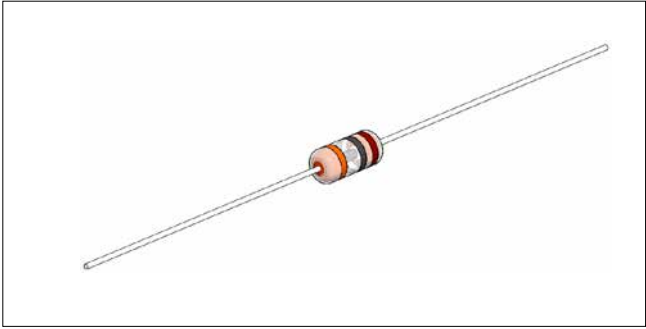
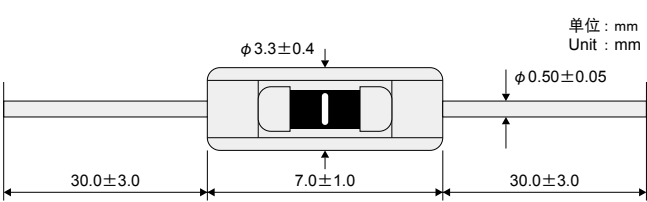
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S00B

包装形式
Packing form

A12F	轴向编带（带宽26mm）、扁平包装 Axial taping (taping width 26mm), ammo pack taping
A22F	轴向编带（带宽52mm）、扁平包装 Axial taping (taping width 52mm), ammo pack taping
A22R	轴向编带（带宽52mm）、卷盘 Axial taping (taping width 52mm), Reel taping
C04F	径向编带、扁平包装 Radial, ammo pack taping
S00B	散装 Bulk pack

■形状・尺寸 Dimensions



■标记 Marking

颜色代码	Color code	第一色带 First color band 型号 Part number	第二色带 Second color band 生产批号十位数 The tens digit of product Lot No.	第三色带 Third color band 生产批号个位数 The unit digit of product Lot No.
黑	Black		0	0
褐	Brown		1	1
红	Red	201M	2	2
橙	Orange	301L	3	3
黄	Yellow	401M	4	4
绿	Green		5	5
蓝	Blue	601M	6	6
紫	Purple		7	7
灰	Gray	351M	8	8
白	White		9	9

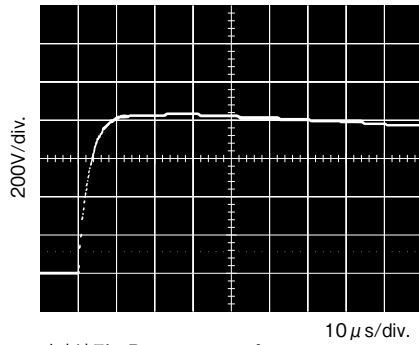
■特性 Characteristics

型 号 Part number	直流放电开始电压 DC spark-over voltage Vs	绝缘阻抗 Insulation resistance IR	静电容量 Electrostatic capacitance 1kHz-6V max C	浪涌耐量 Surge current capacity 8/20 μs.	浪涌寿命 Surge life test	UL规格认证产品 UL recognized
DSS-201M	200V (160~240)	≥100MΩ	<1pF	500A	1) DOC1单循环 DOC 1cycle	UL 497B File No. E175280
DSS-301L	300V (255~345)					○
DSS-351M	350V (280~420)					○
DSS-401M	400V (320~480)					—
DSS-601M	600V (480~720)					○

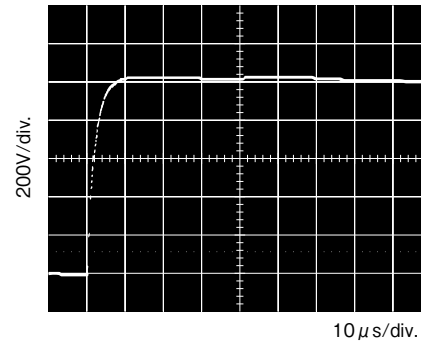
1) : DOC 1cycle 10/1000 μ s 1KV-12times, 100/1000 μ s 1KV-12times respectively.
2) : 安全标准认定条件可能会被修订。关于最新的认定状况，请确认各标准的主页。
: Safety standard certification conditions may be revised. Would you confirm the web site of each standard about the latest information.

■浪涌响应特性(参考值) Surge Response characteristics (Reference)

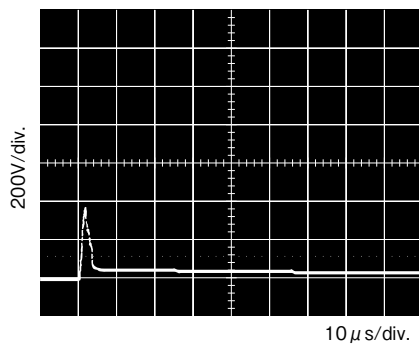
浪涌原波形 Original waveform
FCC 10/560 μ s 800V



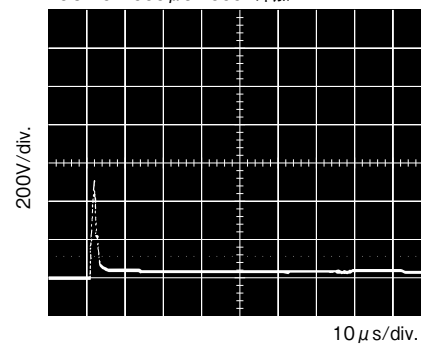
DOC 10/1000 μ s 1000V



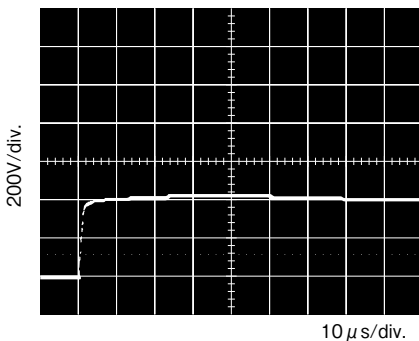
响应波形 Response waveform
DSS-301L
FCC 10/560 μ s 800V外加



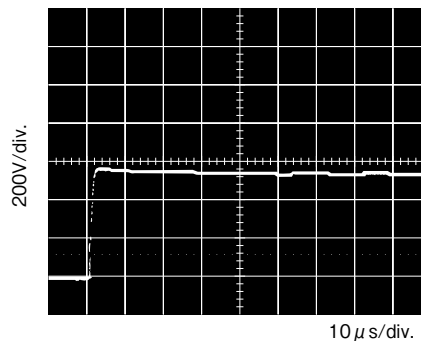
DSS-401L
DOC 10/1000 μ s 1000V外加



压敏电阻 Varistor 270V



压敏电阻 Varistor 390V



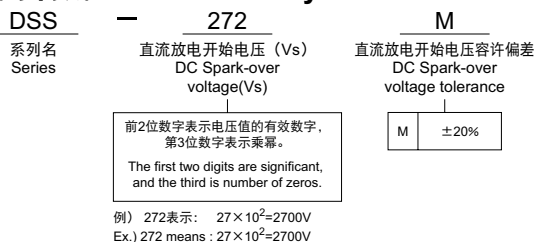
■ 特长

- 结构极其小巧，且放电开始电压为高电压(备有2700、3000V共2个品种)
- DSS-272M可适应AC1200V-3秒或AC1000V-1分钟、DSS-302M可适应AC1500V-1分钟的AC耐压试验
- 浪涌吸收性好，限制电压低
- 静电容量小，绝缘性(100MΩ以上)优异
- 可稳定应对反复浪涌及环境变化
- 无极性
- 无明暗效应
- 本系列已获得UL1449、CSA、TÜV认证
- 使用温度范围（一般规格）：-40~85℃
- 保存温度范围（一般规格）：-55~125℃

■ Features

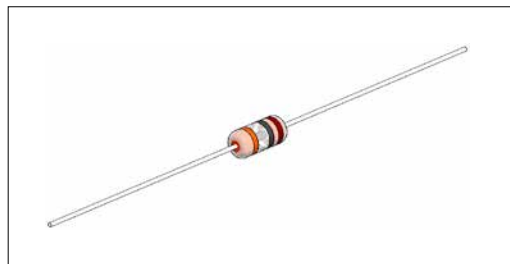
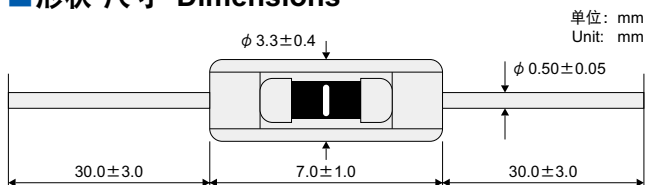
- High DC spark-over voltage in spite of compact size (2types; 2700, 3000V).
- DSS-272M and DSS-302M each correspond to 1200volts rms 3seconds or 1000volts rms 1minute and 1500volts rms 1minute AC withstanding voltage tests respectively.
- Quick response for surge voltage and low limiting voltage.
- Small capacitance and excellent insulation resistance (100MΩmin)
- Stable for repeated discharge test conditions and environmental fluctuation.
- No polarity.
- No dark effect.
- This series are recognized under UL1449, CSA and TÜV.
- Operating temperature limit: -40~85℃
- Storage Temperature Range: -55~125℃

■ 型号构成 Part number system

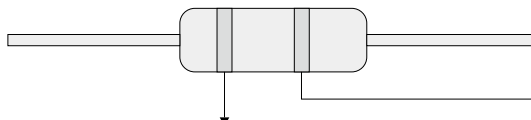


包装形式 Packing form	
A12F	轴向编带 (带宽26mm)、扁平带装 Axial taping (taping width 26mm), Flat pack taping
A22F	轴向编带 (带宽52mm)、扁平带装 Axial taping (taping width 52mm), Flat pack taping
A22R	轴向编带 (带宽52mm)、卷盘 Axial taping (taping width 52mm), Reel
S00B	散装 Bulk pack

■ 形状·尺寸 Dimensions



■ 标记 Marking



颜色代码 Color code	第一色带 First color band	第二色带 Second color band
黑 Black	型号 Part number	生产批号个位数 The unit digit of lot number
褐 Brown		0
红 Red	272M	1
橙 Orange	302M	2
黄 Yellow		3
绿 Green		4
蓝 Blue		5
紫 Purple		6
灰 Gray		7
白 White		8
		9

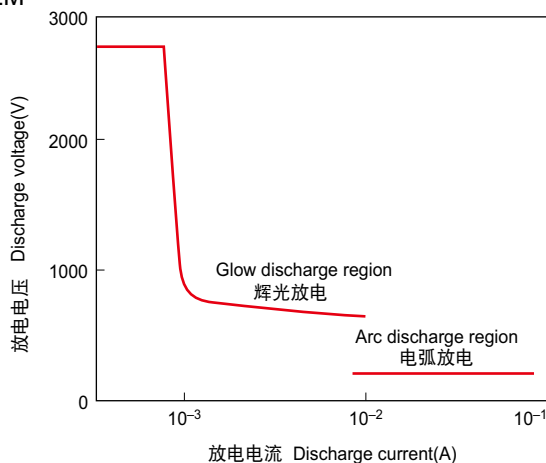
■ 特性 Characteristics

型 号 Part number	直流放电开始电压 DC spark-over voltage Vs	绝缘阻抗 Insulation resistance IR		静电容量 Electrostatic capacitance 1kHz-6V max C	AC耐电压 AC withstanding voltage	浪涌耐量 Surge current capacity 8/20 μ s	浪涌寿命 Surge life test	UL规格认证产品 UL recognized	CSA规格认证产品 CSA recognized	EN规格认证产品 EN recognized
								UL 1449 File No. E318314	CSA C22.2No.269.5-17 File No. 111411	EN62368-1 TUV Report No. J9750615
DSS-272M	2,700V (2,160~3,240)	≥ 100MΩ	DC500V	≤ 1pF	AC1,000V-1min AC1,200V-3s	500A	8/20 μ s 50A 300 times	○ 1)	○ 1)	—
DSS-302M	3,000V (2,400~3,600)				AC1,500V-1min			○ 1)	○ 1)	○ 2)

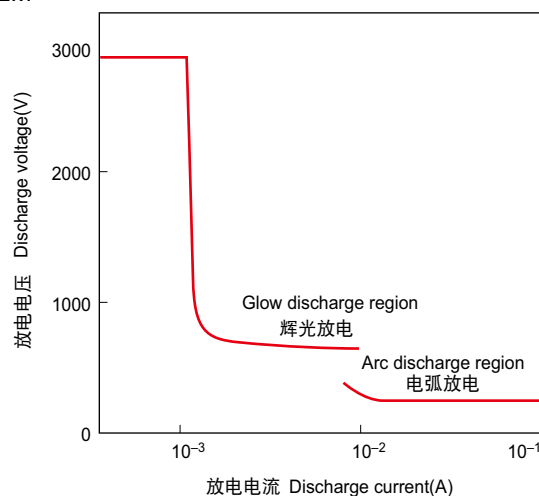
- 1) 与压敏电阻 (AC125V: V1mA ≥ 270V, D ≥ φ 5mm, AC250V: V1mA ≥ 470V, D ≥ φ 5mm) 电气串联即可被认证。
: Approved if used with a varistor (125VAC: V1mA ≥ 270V, φ ≥ 5mm; 250VAC: V1mA ≥ 470V, φ ≥ 5mm) electrically connected in series.
- 2) 与压敏电阻 (V 1mA ≥ 470V, D ≥ φ 10mm) 电气串联即可被认证。
: Approved if used with a varistor (V1mA ≥ 470V, φ ≥ 10mm) electrically connected in series.
- 3) 安全标准认定条件可能会被修订。关于最新的认定状况，请确认各标准的主页。
: Safety standard certification conditions may be revised. Would you confirm the web site of each standard about the latest information.

■ V—I 特性(参考值) Characteristics (Reference)

DSS-272M



DSS-302M

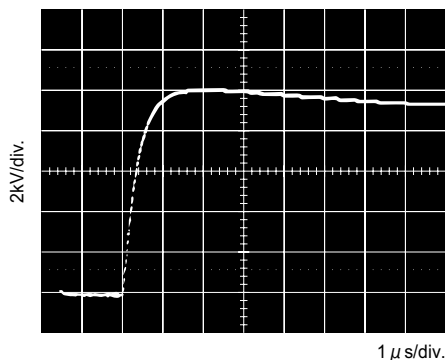


■ 浪涌响应特性(参考值) Surge Response characteristics (Reference)

浪涌原波形

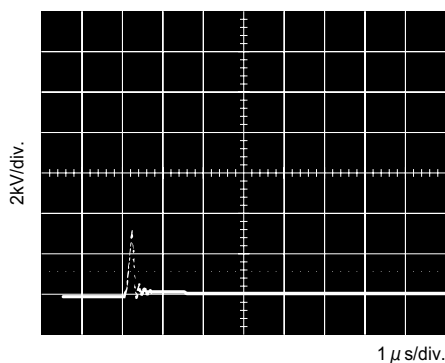
Original waveform

1.2/50 μ s 10kV



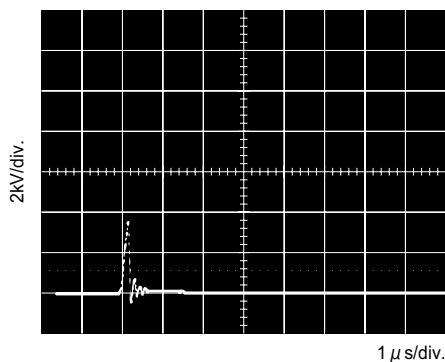
DSS-272M响应波形

DSS-272M Response waveform



DSS-302M响应波形

DSS-302M Response waveform



CDA70 系列是贴片式通讯线路用电压吸收器。

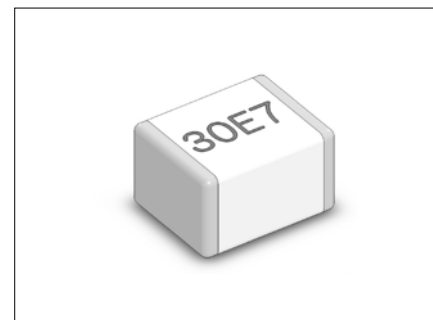
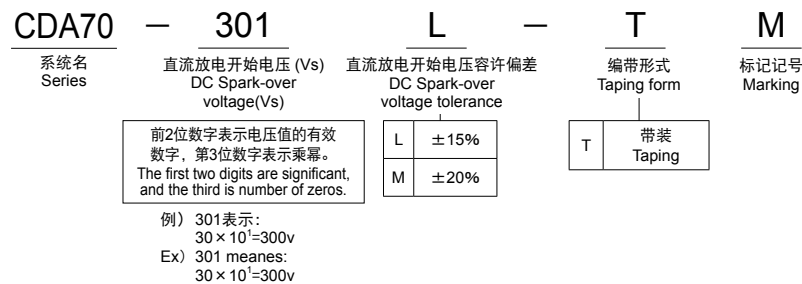
实现高质冲击响应特性和 0.6pF 以下低静电容量。

虽然是 4032 形状的小型低背贴片，但是具有 8/20 μ s-2,000A 型的抗冲击破坏力。400V 的产品符合 ADSL POTS ★分路器用规格：ITU-T（国际电信联盟试验规格）K.20 或 K.21 的 Enhanced Test Condition。

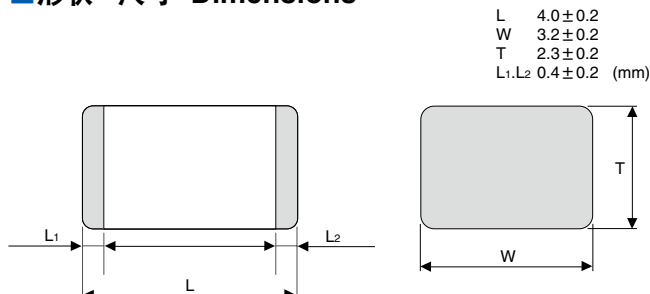
■特点

- 以 4032 形状的小型贴片应对自动安装
- 应对正流、回流焊焊
- 可应对各种 AC 耐压测试
- 高质响应性
- 0.6pF 以下的低静电容量、100M Ω 以上的高绝缘阻抗
- 可稳定应对反复浪涌
- 已通过 UL1449 标准
- RoHS 适应品
- 使用温度范围（一般规格）：-40 ~ 125℃
- 保存温度范围（一般规格）：-40 ~ 125℃

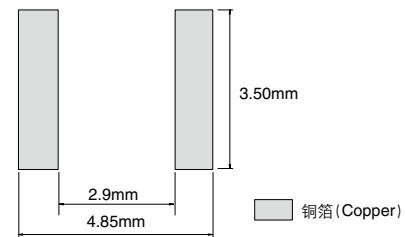
■型号构成 Part number system



■形状・尺寸 Dimensions



■推荐焊盘布局 Recommended Land Pattern



■特性 Characteristics

型 号 Part number	直流放电开始电压 DC Spark-over voltage Vs	绝缘阻抗 Insuation resistance IR		静电容量 Electrostatic capacitance 1kHz-6V max. C	浪涌耐量 Surge current Capacity 8/20 μ s	浪涌寿命 Surge life test	AC耐电压 Withstanding Voltage	UL规格认证产品 UL recognized		cUL规格认证产品 cUL recognized	EN规格认证产品 EN recognized
								UL497B File No. E175280	UL1449 File No. E318314	CSA C22.2No.269 UL File No. E318314	EN62368-1 File No. J50164470
CDA70-701M	700V (560~840)	$\geq 100M\Omega$	DC250V	$\leq 0.6\text{pF}$	2,000A	8/20 μ s 100A 300times	—	○	○ 1)	○ 1)	—
CDA70-102M	1,000V (800~1,200)		DC500V				—	—	○ 1)	○ 1)	—
CDA70-272M	2,700V (2,160~3,240)						AC1,000V-1min AC1,200V-3s	—	○ 1)	○ 1)	—
CDA70-302M	3,000V (2,400~3,600)						AC1,500V-1min	—	○ 1)	○ 1)	○ 2)
CDA70-362M	3,600V (2,880~4,320)						AC1,800V-3s	—	○ 1)	○ 1)	○ 2)

1)：与压敏电阻 (AC125V : V 1mA $\geq 270V$ D $\geq \phi$ 7mm, AC250V : V 1mA $\geq 470V$ D $\geq \phi$ 7mm) 电气串接即可被认证。

Approved if used with a varistor (125VAC : V1mA $\geq 270V$, D $\geq \phi$ 7mm, 250VAC : V1mA $\geq 470V$, D $\geq \phi$ 7mm), electrically connected in series.

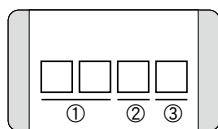
2)：与压敏电阻 (V 1mA $\geq 470V$ D $\geq \phi$ 5mm) 电气串接即可被认证。

Approved if used with a varistor (V1mA $\geq 470V$, D $\geq \phi$ 5mm), electrically connected in series.

3)：安全标准认定条件可能会被修订。关于最新的认定状况，请确认各标准的主页。

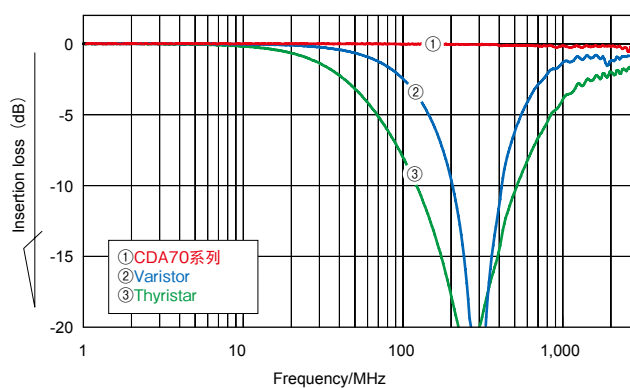
: Safety standard certification conditions may be revised. Would you confirm the web site of each standard about the latest information.

■ 标记 Marking



- ① 型号略符 (最多两位数字)
Part number (Number with two digits maximum)
- ② 生产月份
Production month
- ③ 生产年份
Production year

■ 插入损失特性(参考值) Insertion loss (Reference Value)



如左图所示，CDA70系列具有0.6pF以下的低静电容量，因此不会阻碍兆位级的高速通信信号。

As can be seen in the figure on the left, the CDA70 series can be used on megabit class lines without inhibiting the high-speed signals due to a low capacitance of less than 0.6pF.

CSA70是贴片式通信线路用浪涌吸收器。采用本公司历经多年研发的微隙方式，实现了优异的浪涌响应特性和0.6pF以下的低静电容量。本产品结构小巧，浪涌耐量达2,000A(8/20 μs)。其中400V的产品符合ADSL POTS*分路器用规格：ITU-T(国际电信联盟-试验规格)K.20或K.21的Basic Test Condition(基本试验条件)。

CSA70 is a chip type surge absorber for protecting communication networks. Through our long history of developing microgap products, we have been able to realize a product with excellent surge protection characteristics and low capacitance of less than 0.6pF. Even with its small package design, it is easily able to withstand 2,000A (8/20 μs) surges. Meets the standard for ADSL POTS* splitters, in accordance with ITU-T (International Telecommunication Union test standard) K.20 and K.21 Basic Test Conditions.
*POTS: Plain Old Telephone Service

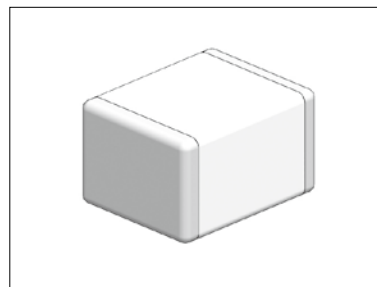
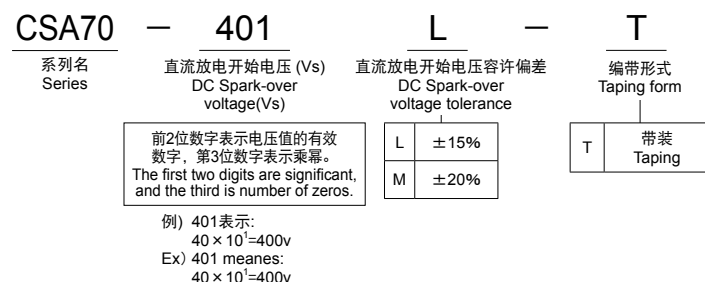
■特点

- 使用4032形状的小型贴片，适合自动插装、流动及回流焊接
- 采用微隙方式，具有优异的浪涌响应效果
- 0.6pF以下的低静电容量，不会阻碍兆字节的高速通信信号
- 100MΩ以上的高绝缘阻抗特性
- 端子电极采用镀锡，是完全无铅产品
- 已获得UL497B认证
- 使用温度范围(一般规格)：-40 ~ 125℃
- 保存温度范围(一般规格)：-40 ~ 125℃

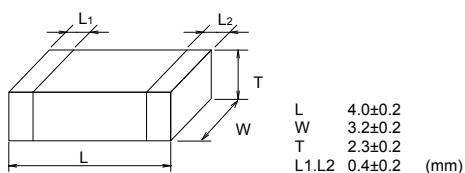
■Features

- Standard small chip package (EIA 1612, height 2.3+/-0.2mm), for use with standard place and reflow solder equipment.
- Superior surge response characteristics from microgap technology.
- Low capacitance of less than 0.6pF means no appreciable attenuation on high-speed, megabit class communication signals.
- High insulation resistance of over 100Mohm.
- Use tin plated electrodes and are completely lead free.
- This series are recognized under UL 497B.
- Operating temperature limit: -40 ~ 125℃
- Storage Temperature Range: -40 ~ 125℃

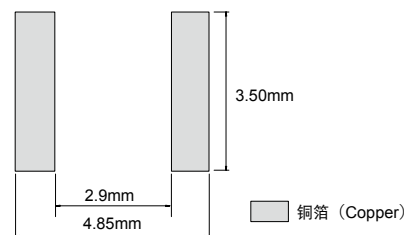
■型号构成 Part number system



■形状・尺寸 Dimensions



■推荐焊盘布局 Recommended Land Pattern



■特性 Characteristics

型号 Part number	直流放电开始电压 DC spark-over voltage Vs	绝缘阻抗 Insulation resistance IR	静电容量 Electrostatic capacitance 1kHz-6V max C	浪涌耐量 Surge current capacity 8/20 μs	浪涌寿命 Surge life test	UL规格认证产品 UL recognized
CSA70-301L	300V (255~345)	≥ 100MΩ	≤ 0.6pF	2,000A	8/20 μs-50A 300 times	UL 497B File No. E175280
CSA70-401L	400V (340~460)					○
CSA70-601M	600V (480~720)					○

1) : 安全标准认定条件可能会被修订。关于最新的认定状况，请确认各标准的主页。

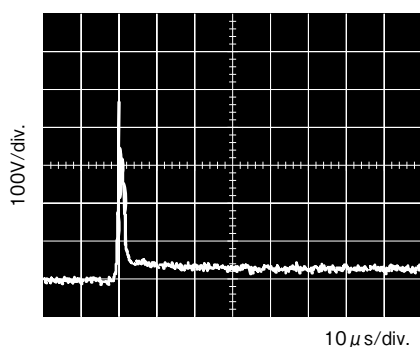
: Safety standard certification conditions may be revised. Would you confirm the web site of each standard about the latest information.

■浪涌响应特性(参考值) Surge Response Characteristics (Reference)

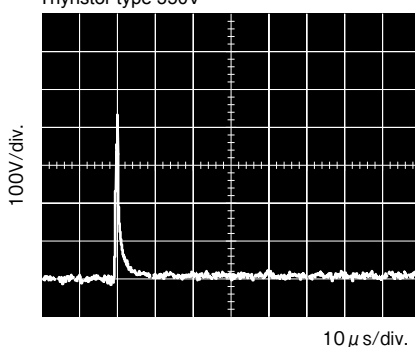
对 10/700 μs 4kV 浪涌的响应波形

Response waveform against 10/700 μs 4kV

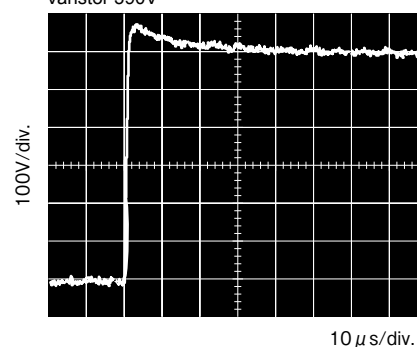
CSA70-401L



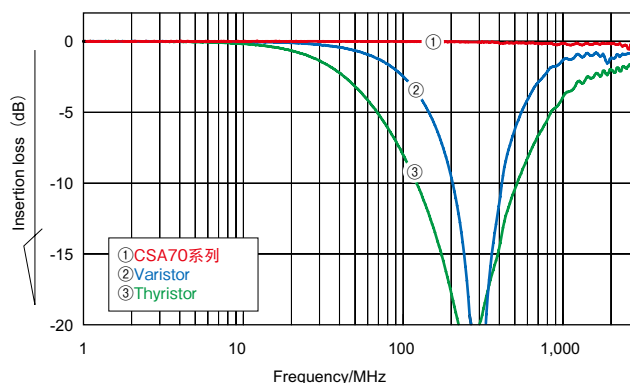
可控硅型
Thyristor type 350V



压敏电阻
Varistor 390V



■插入损失特性(参考值) Insertion loss properties (Reference)



如左图所示, CSA70系列具有0.6pF以下的低静电容量, 因此不会阻碍兆位级的高速通信信号。

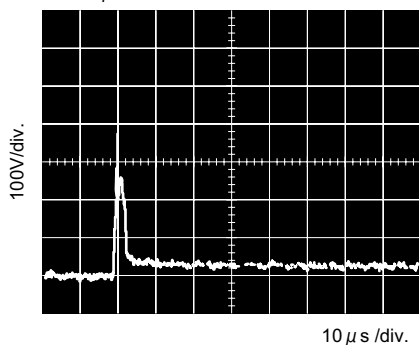
As can be seen in the figure on the left, the CSA70 series can be used on megabit class lines without in bibiting the high-speed signals due to a low capacitance of less than 0.6pF.

■ CSA70-401L的ITU-T K.20或K.21的基本试验条件 (参考)

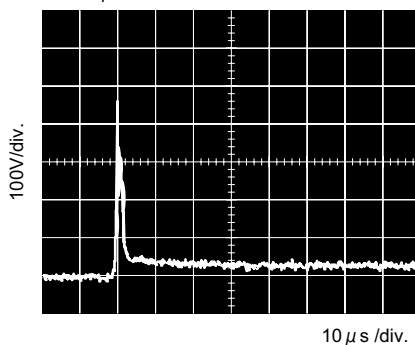
浪涌试验: 10/700 μ s 1.5kV/4kV(25 Ω) $\pm$ 5次

Surge Test

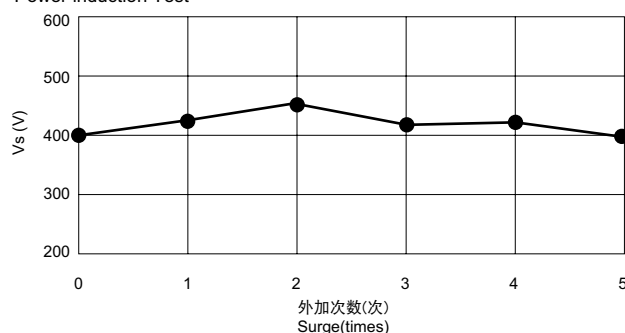
响应波形 Response waveform
10/700 μ s 1.5kV



响应波形 Response waveform
10/700 μ s 4kV



AC感应试验: AC600V(600 Ω)1s 5次
Power induction Test



如左图所示, 在本试验中, CSA70-401L的放电开始电压未下降。同时, 绝缘阻抗、静电容量也未变化。

As seen in the figure on the left, through out the test, the breakdown voltage never decreases, Furthermore, there is no charge in the insulation resistance or capacitance of the part.

AC交叉试验: AC230V(10~1000 Ω)15min.
Power cross Test

但外加AC230V时, CSA70-401L未响应。

However, AC230V is too low for CSA70-401L to react.

如上所示, CSA70-401L符合ADSL POTS*分路器用规格: ITU-T(国际电信联盟 试验规格)K.20或K.21的Basic Test Condition(基本试验条件)。

As mentioned above, CSA70-401L correspond to ITU-T (International / Telecommunication Union Test Standard) K.20 or K.21 Basic Test Conditions for the ADSL POTS* splitter standard

■焊接条件请参见第94页。 Please refer to page 94 for soldering conditions.

■特点

- 可用于车载音响、无线电设备、VTR、BS调谐器等天线的防静电
- 可用于显示装置、监视器的防管内放电(DSP-141N型除外)
- 可用于其他防静电
- 使用温度范围(一般规格): -40 ~ 85℃
- 保存温度范围(一般规格): -55 ~ 125℃

■Features

- Car radio, radio cassette, wireless, new media.
- Protection from electrostatic discharge in a CRT display or monitor TV. (Except DSP-141N)
- Protection against electrostatic discharge.
- Operating temperature limit : -40 ~ 85℃
- Storage Temperature Range : -55 ~ 125℃

■型号构成 Part number system

DSP

系列名
Series

—

301

直流放电开始电压 (Vs)
DC Spark-over
voltage(Vs)

前2位数字表示电压值的有效数字,
第3位数字表示乘幂。
The first two digits are significant,
and the third is number of zeros.

例) 301表示:
30 × 10¹=300v
Ex) 301 means:
30 × 10¹=300v

N

直流放电开始电压容许偏差
DC Spark-over
voltage tolerance

M	±20%
N	±30%

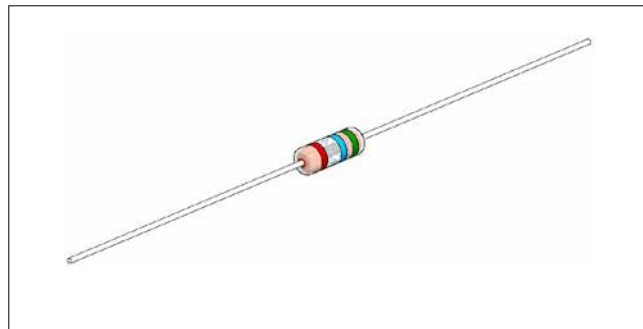
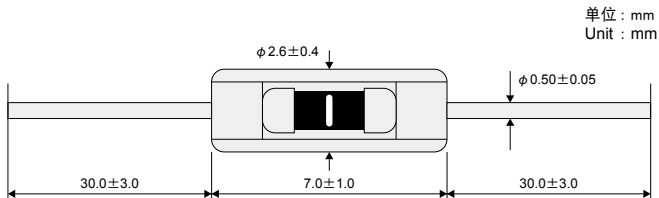
—

S00B

包装形式
Packing form

A11F	轴向编带 (带宽26mm)、扁平带装 Axial taping (taping width 26mm), ammo pack taping
A21F	轴向编带 (带宽52mm)、扁平带装 Axial taping (taping width 52mm), ammo pack taping
A21R	轴向编带 (带宽52mm)、卷盘 Axial taping (taping width 52mm), Reel taping
C04F	径向编带、扁平带装 Radial, ammo pack taping
S00B	散装 Bulk pack

■形状·尺寸 Dimensions



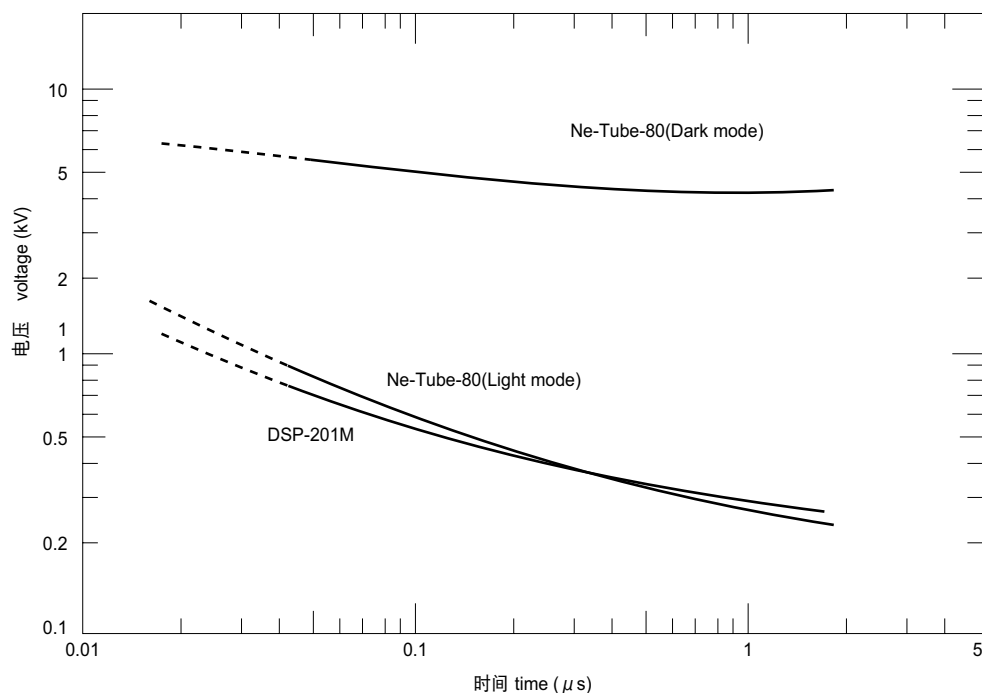
■标记 Marking

颜色代码 Color code	第一色带 First color band	第二色带 Second color band	第三色带 Third color band
	型号 Part number	生产批号十位数 The tens digit of product Lot No.	生产批号个位数 The unit digit of product Lot No.
黑 Black		0	0
褐 Brown		1	1
红 Red	201M	2	2
橙 Orange	301N	3	3
黄 Yellow		4	4
绿 Green	501N	5	5
蓝 Blue		6	6
紫 Purple	751N	7	7
灰 Gray		8	8
白 White	141N	9	9

■特性 Characteristics

型号 Part number	直流放电开始电压 DC spark-over voltage Vs	绝缘阻抗 Insulation resistance IR	静电容量 Electrostatic capacitance 1kHz-6V max C	浪涌耐量 Surge current capacity 8/20 μs.	浪涌寿命 Surge life test
DSP-141N	140V (98~182)	≥ 100MΩ	≤1pF	1,000A	1,500pF-0Ω-10kV 200 times
DSP-201M	200V (160~240)				
DSP-301N	300V (210~390)				
DSP-501N	500V (350~650)				
DSP-751N	750V (525~975)				

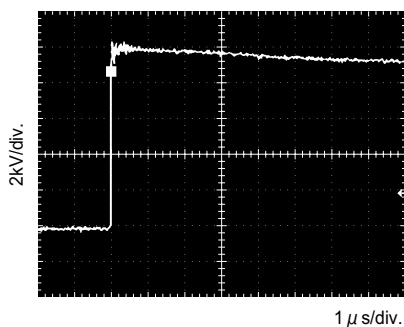
■ V—t 特性(参考值) V—t Characteristics (Reference)



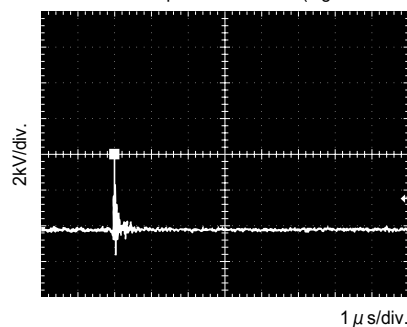
- 表现出快速响应瞬变静电的特性。
- 无明显暗效应。
- Rapid response against electrostatic discharge with instantaneous rise.
- No dark effect.

■ 静电响应特性(参考值) Electrostatic response characteristics (Reference)

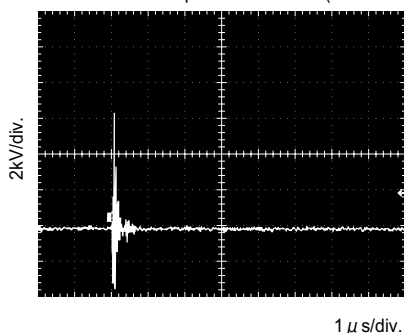
静电原波形 Original waveform
500pF—500Ω—10kV



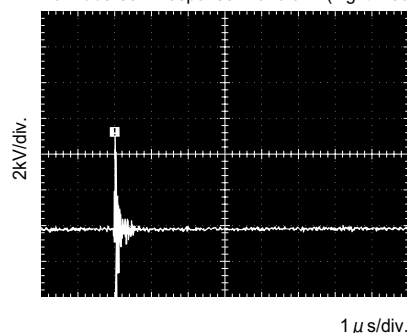
DSP-201M响应波形(明、暗)
DSP-201M Response waveform (Light & Dark mode)



Ne管(80V)响应波形(暗)
Ne-Tube-80V Response waveform (Dark mode)



Ne管(80V)响应波形(明)
Ne-Tube-80V Response waveform (Light mode)



■特点

- 结构极其小巧，且放电开始电压为高电压
(备有1000、1500、2700、3000V4个品种)
- DSP-272M可适应AC1200V-3秒或AC1000V-1分钟、DSP-302M可适应AC1500V-1分钟的AC试验
- 静电浪涌吸收性好，限制电压低
- 静电容量小，绝缘性(100MΩ以上)优异
- 可稳定应对反复静电浪涌及环境变化
- 无极性
- 无明显暗效应
- 使用温度范围(一般规格): -40 ~ 85℃
- 保存温度范围(一般规格): -55 ~ 125℃

■Features

- High DC spark-over voltage
(4types; 1000, 1500, 2700, 3000V) in spite of compact size.
- DSP-272M and DSP-302M each correspond to 1200volts rms 3seconds or 1000volts rms 1minute and 1500volts rms 1minute AC withstanding voltage tests respectively.
- Quick response for electrostatic surge and low limiting voltage.
- Small capacitance and excellent insulation resistance (100MΩ min)
- Stable for repeated electrostatic test conditions and environmental fluctuation.
- No polarity.
- No dark effect.
- Operating temperature limit : -40 ~ 85℃
- Storage Temperature Range : -55 ~ 125℃

■型号构成 Part number system

DSP — 272 M — A21R

系列名
Series

直流放电开始电压 (Vs)
DC Spark-over
voltage(Vs)

直流放电开始电压容许偏差
DC Spark-over
voltage tolerance

包装形式
Packing form

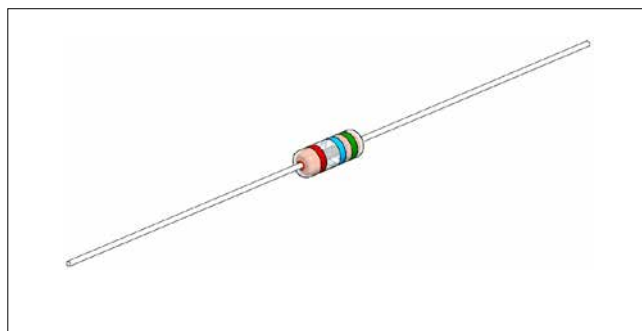
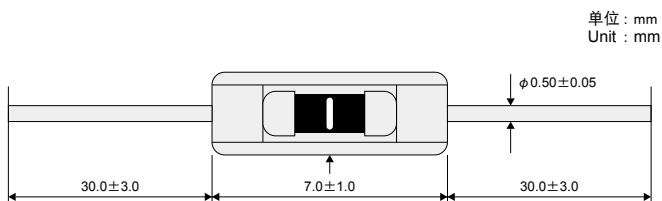
前2位数字表示电压值的有效数字，第3位数字表示乘幂。
The first two digits are significant, and the third is number of zeros.

例) 272表示 $27 \times 10^2 = 2700V$
Ex.) 272means $27 \times 10^2 = 2700V$

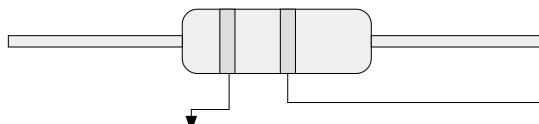
M ±20%

A11F	轴向编带(带宽26mm)、扁平带装 Axial taping (taping width 26mm), ammo pack taping
A21F	轴向编带(带宽52mm)、扁平带装 Axial taping (taping width 52mm), ammo pack taping
A21R	轴向编带(带宽52mm)、卷盘 Axial taping (taping width 52mm), Reel taping
S00B	散装 Bulk pack

■形状·尺寸 Dimensions



■标记 Marking



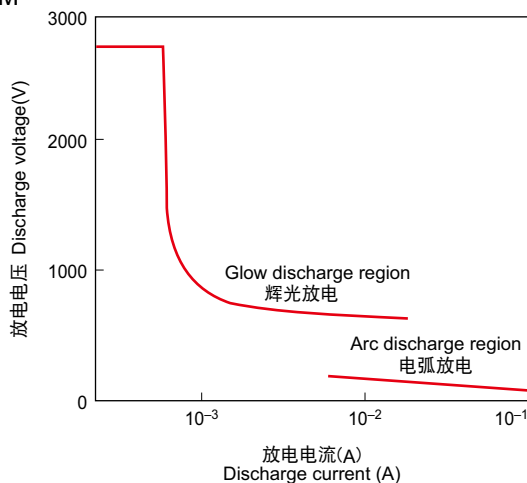
颜色代码 Color code	Color code	第一色带 First color band	第二色带 Second color band
		型号 Part number	生产批号个位数 The unit digit of lot number
黑	Black	102M	0
褐	Brown	152M	1
红	Red	272M	2
橙	Orange	302M	3
黄	Yellow		4
绿	Green		5
蓝	Blue		6
紫	Purple		7
灰	Gray		8
白	White		9

■特性 Characteristics

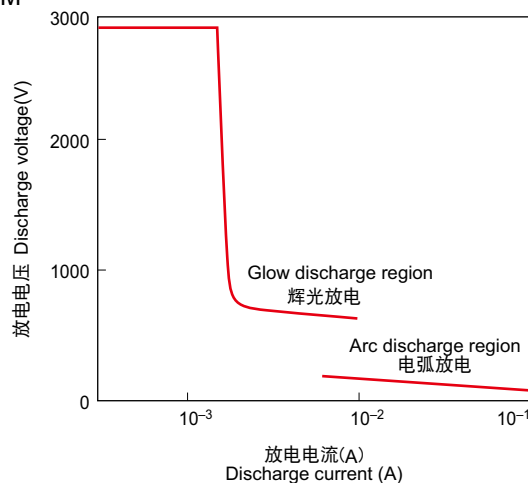
型号 Part number	直流放电开始电压 DC spark-over voltage Vs	绝缘阻抗 Insulation resistance IR		静电容量 Electrostatic capacitance 1kHz-6V max C	AC耐电压 AC withstanding voltage	浪涌耐量 Surge current capacity 8/20 μs.	浪涌寿命 Surge life test
DSP-102M	1,000V (800~1,200)	≥ 100MΩ	DC500V	≤ 1pF	—	300A	1,500pF-0Ω-10kV 200 times
DSP-152M	1,500V (1,200~1,800)				—		
DSP-272M	2,700V (2,160~3,240)				AC1,000V-1min AC1,200V-3s		
DSP-302M	3,000V (2,400~3,600)				AC1,500V-1min		

■ V—I 特性(参考值) V—I Characteristics (Reference)

DSP-272M

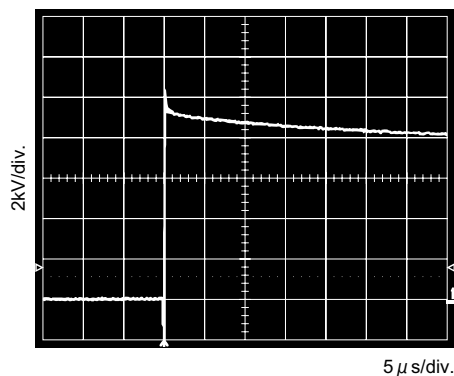


DSP-302M

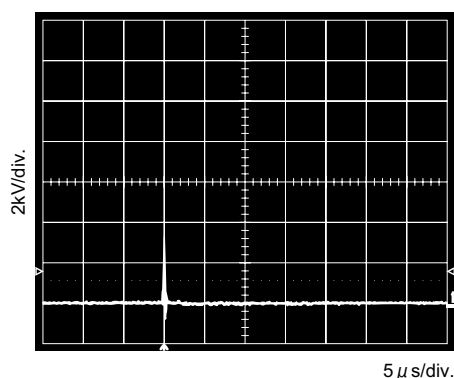


■ 静电响应特性(参考值) Electrostatic response characteristics (Reference)

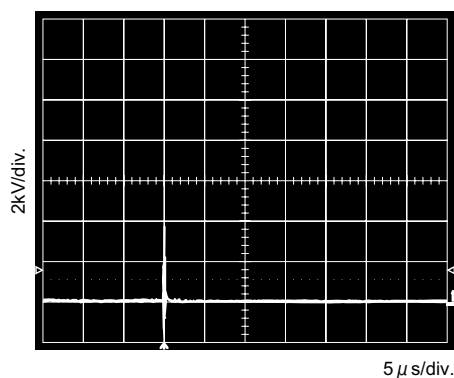
静电原波形 Original waveform
500pF-500Ω-10kV



DSP-272M响应波形
DSP-272M Response waveform



DSP-302M响应波形
DSP-302M Response waveform



CSA30 (3216 形状) 是贴片式防静电浪涌吸收器。采用本公司历经多年研发的微隙方式, 实现了优异的浪涌响应特性和 1pF 以下的低静电容量。本产品结构小巧, 静电浪涌耐量达 150pF-330Ω-25kV, 完全符合 IEC61000-4-2 的要求。

CSA30 (EIA 1206 size) is a chip type surge absorber for protection from ESD (electrostatic discharge). Through our long history of developing microgap products, we have been able to realize a product with excellent surge protection characteristics and low capacitance of less than 1pF. Even with its small package design, it is easily able to meet the electrostatic protection requirements of IEC61000-4-2.

■特点

- 适合高密度表面贴装的防静电浪涌吸收器
- 适合流动和回流焊接
- 采用微隙方式, 具有优异的浪涌响应效果
- 静电容量小, 可用于高频电路
- 高绝缘阻抗特性
- 可以编带包装
- 符合 IEC61000-4-2 规格
- 使用温度范围 (一般规格): -40 ~ 125°C
- 保存温度范围 (一般规格): -55 ~ 125°C

■Features

- ESD surge absorber in a compact surface mount package
- Can be used with flow or reflow solder
- Microgap technology gives excellent surge response
- Can use in high frequency circuits due to low capacitance
- High insulation resistance characteristics
- Available in embossed taping
- Conforms with IEC61000-4-2 standard
- Operating temperature limit: -40 ~ 125°C
- Storage Temperature Range: -55 ~ 125°C

■型号构成 Part number system

CSA30

—

141

—

N

—

系列名
Series

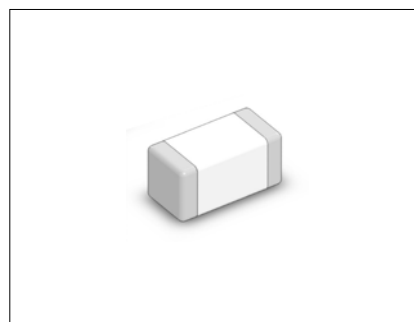
直流放电开始电压 (Vs)
DC Spark-over
voltage(Vs)

直流放电开始电压容许偏差
DC Spark-over
voltage tolerance

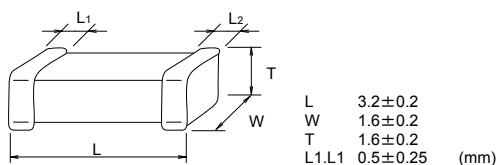
前2位数字表示电压值的有效数字,
第3位数字表示乘幂。
The first two digits are significant,
and the third is number of zeros.

N	±30%
Q	+30% -20%

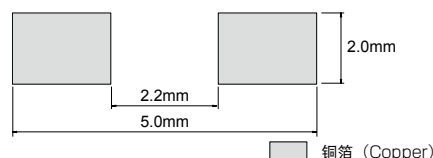
例) 141表示:
 $14 \times 10^1 = 140\text{V}$
Ex) 141 means:
 $14 \times 10^1 = 140\text{V}$



■形状・尺寸 Dimensions



■推荐焊盘布局 Recommended Land Pattern



■特性 Characteristics

型号 Part number	直流放电开始电压 DC spark-over voltage Vs	绝缘阻抗 Insulation resistance IR		静电容量 Electrostatic capacitance 1kHz-6V max C	浪涌寿命 (接触放电) Surge life test (Contact discharge)
CSA30-141N	140V (98~182)	≥ 100MΩ	DC50V	≤ 1pF	150pF-330Ω-25kV 20 times
CSA30-401Q	400V (320~520)		DC250V		

■关于 IEC61000-4-2

- 静电放电抗扰度试验
150pF-330Ω-2 ~ 8kV (接触放电)
2 ~ 15kV (空气放电)
CSA30 具有 150pF-330Ω-25kV 的静电浪涌耐量, 完全满足上述要求。

■About IEC61000-4-2

- Electrostatic discharge immunity test
150pF-330Ω-2 ~ 8kV (Contact discharge)
2 ~ 15kV (Air discharge)
CSA30 series easily able to meet requirements of IEC61000-4-2.

■焊接条件请参见第 94 页。 Please refer to page 94 for soldering conditions.

CSA20 (2125 形状) 是贴片式防静电浪涌吸收器。采用本公司历经多年研发的微隙方式, 实现了优异的浪涌响应特性和 1pF 以下的低静电容量。本产品结构小巧, 静电浪涌耐量达 150pF-330Ω-20kV, 完全符合 IEC61000-4-2 的要求。

CSA20 (EIA 0805 size) is a chip type surge absorber for protection from ESD (electrostatic discharge). Through our long history of developing microgap products, we have been able to realize a product with excellent surge protection characteristics and low capacitance of less than 1pF. Even with its small package design, it is easily able to meet the electrostatic protection requirements of IEC61000-4-2.

■特点

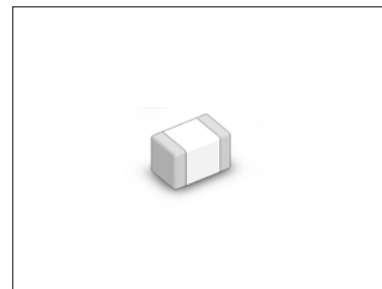
- 适合高密度表面贴装的防静电浪涌吸收器
- 适合流动和回流焊接
- 采用微隙方式, 具有优异的浪涌响应效果
- 静电容量小, 可用于高频电路
- 高绝缘阻抗特性
- 可以编带包装
- 符合 IEC61000-4-2 规格
- 使用温度范围 (一般规格): -40 ~ 125°C
- 保存温度范围 (一般规格): -55 ~ 125°C

■Features

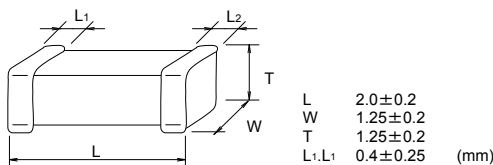
- ESD surge absorber in a compact surface mount package
- Can be used with flow or reflow solder
- Microgap technology gives excellent surge response
- Can use in high frequency circuits due to low capacitance
- High insulation resistance characteristics
- Available in embossed taping
- Conforms with IEC61000-4-2 standard
- Operating temperature limit: -40 ~ 125°C
- Storage Temperature Range: -55 ~ 125°C

■型号构成 Part number system

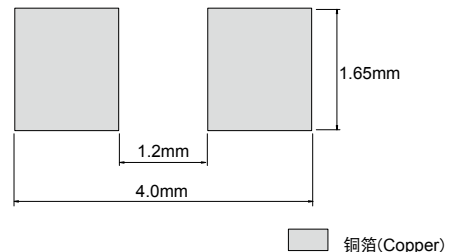
系列名 Series	直流放电开始电压 (Vs) DC Spark-over voltage(Vs)	直流放电开始电压容许偏差 DC Spark-over voltage tolerance	编带形式 Taping form
CSA20	141	N	T
前2位数字表示电压值的有效数字, 第3位数字表示乘幂。 The first two digits are significant, and the third is number of zeros.			
例) 141表示: 14 × 10 ¹ = 140V Ex) 141 means: 14 × 10 ¹ = 140V			
		N ±30% Q +30% -20%	B 散装 Bulk T 带装 Taping



■形状・尺寸 Dimensions



■推荐焊盘布局 Recommended Land Pattern



■特性 Characteristics

型号 Part number	直流放电开始电压 DC spark-over voltage Vs	绝缘阻抗 Insulation resistance IR		静电容量 Electrostatic capacitance 1kHz-6V max C	浪涌寿命 (接触放电) Surge life test (Contact discharge)
CSA20-141N	140V (98~182)	≥ 100MΩ	DC50V	≤ 1pF	150pF-330Ω-20kV 20 times
CSA20-401Q	400V (320~520)		DC250V		

■关于 IEC61000-4-2

- 静电放电抗扰度试验
150pF-330Ω-2 ~ 8kV (接触放电)
2 ~ 15kV (空气放电)
CSA20 具有 150pF-330Ω-20kV 的静电浪涌耐量,
完全满足上述要求。

■About IEC61000-4-2

- Electrostatic discharge immunity test
150pF-330Ω-2 ~ 8kV (Contact discharge)
2 ~ 15kV (Air discharge)
CSA20 series easily able to meet requirements of IEC61000-4-2.

■焊接条件请参见第 94 页。 Please refer to page 94 for soldering conditions.

线路浪涌保护器“LITOL”系列可保护各种电子设备免遭感应雷击浪涌（雷害）、噪声等异常电压的损害。LTP 系列可以安装在控制盘或配电盘内。

■特点

- 1 台便可保护线间、对地间
- 操作和安装都非常简单
- 可有效抵御重复电涌，寿命较长
- 支持额定电压 AC125V/AC250V/AC400V
- 面对雷电电涌，会迅速工作，保护机器
- 支持等级 II（JIS C5381-11）的浪涌测试条件
- 使用温度范围（一般规格）：-25 ~ 85℃
- 保存温度范围（一般规格）：—

■典型应用例

- NC 机床、放电加工机、机械手等

（接线方法）

设备控制盘的输入处有 R, S(N), T, E 铭牌。LTP-250□（LTP-125□, LTP-400□）的接线板上也有相同的表示，所以请用同捆电线分别对 R-R, S-S(N-N), T-T, E-E 进行接线。

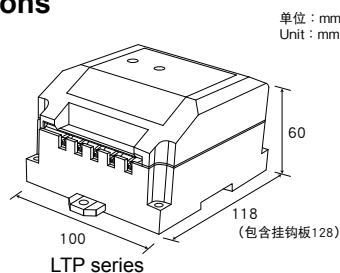
（Wiring method）

There are name plates of R,S(N), T,E in power line input of machine control panel. Please connect corresponding parts of “LTP-250□（LTP-125□, LTP-400□）” to the above, like R-R, S-S(N-N) and T-T, E-E.

■型号构成 Part number system

LTP	—	125	□
形状 Shape		额定电压 Rated voltage	记号 code
		125 AC125V	R Imax=20kA
		250 AC250V	F 可显示功能 Operating indicator LED
		400 AC400V	

■形状·尺寸 Dimensions



■特性 Characteristics

型 号 Part number	最大连续使用电压 Maximum continuous operating voltage Uc	标称放电电流 Nominal discharge current In	最大放电电流 Maximum discharge current Imax	电压保护标准 Voltage protection level Up 1)		功能显示 Operating indicator 2)	
NEW LTP-125RF	AC150V（单相 3 线） (Single-phase 3 wires)	10kA (8/20μs)	20kA (8/20μs)	线—线	Line to line	1.2kV	有 YES
NEW LTP-250RF	AC275V（3 相 3 线） (Three-phase 3 wires)			线—GND	Line to ground	1.5kV	
				线—线	Line to line	1.5kV	
				线—GND	Line to ground	1.5kV	
NEW LTP-400RF	AC510V（3 相 3 线） (Three-phase 4 wires)			线—线	Line to line	2.5kV	
				线—GND	Line to ground	2.5kV	

1)：标称放电电流 In（8/20 μs）外加时

2)：功能显示灯亮起（如通电中或没开灯，请更换）

1)：Nominal discharge current In：8/20 μs

2)：The LED isn't replace the immediately.

LITOL Line Surge Protector has been developed to effectively protect all types of electronic equipment and machinery from induced surge voltages from lightning and from electrical noise.

The LTP series can be installed in control boxes and in switch boards.

■Features

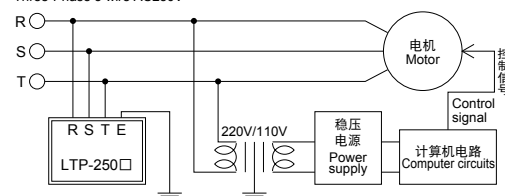
- 1 unit can protect between lines and between ground
- Compact and easy to mount
- Durable against multiple surges, long life
- Compatible with rating of 125VAC/250VAC/400VAC
- Responds quickly to lightning surges, protects devices
- Satisfy with ClassII surge test condition.
（JIS C5381-11）
- Operating temperature limit：-25 ~ 85℃
- Storage Temperature Range：—

■Applications

- NC tooling, arc discharge machining, robots, etc.

LTP-250□

三相3线AC250V
Three-Phase 3 wire AC250V

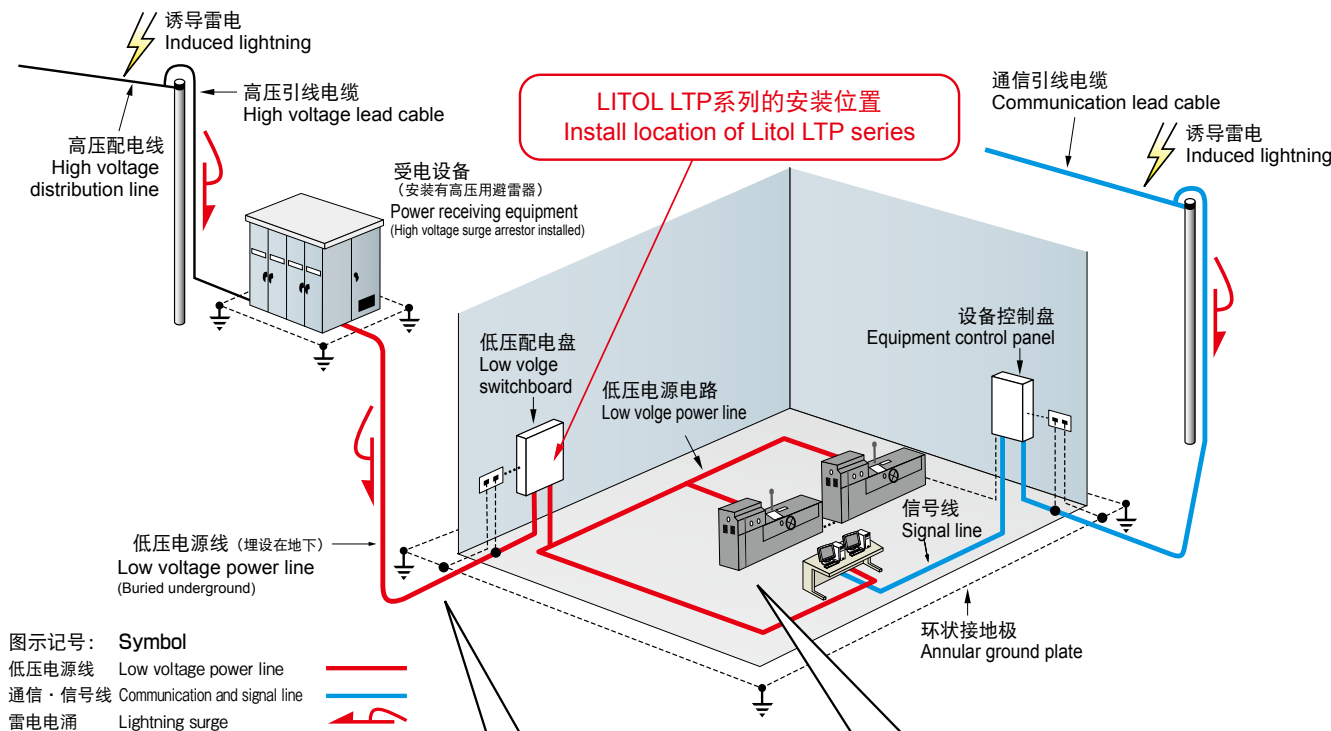


雷电电涌的侵入途径和配电盘、控制盘的雷电对策

Intrusion route of lightning surge and measures against surge to switchboard and control panel

工厂示例

Example: Power Line of Factory

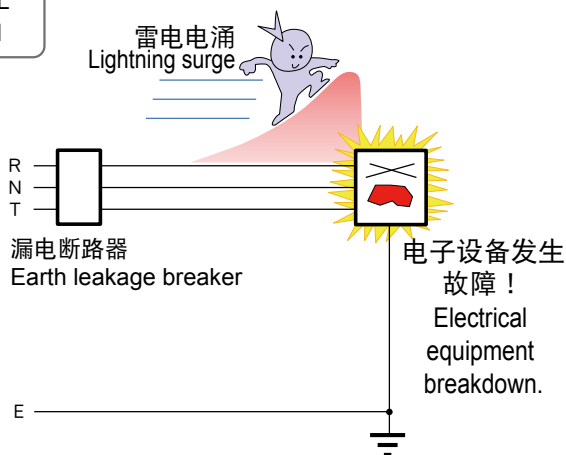


发生雷击时，异常电压通过配电线侵入工厂。
In case of lightning, abnormal voltage intrudes into the factory via the distribution line.

如果没有安装LITOL，异常电压可能会直接到达工厂内的设备、机器，造成破坏。
If Litol is not installed, abnormal voltage may directly reach the facility equipment in the factory and destroy it.

LITOL(LTP)的用途

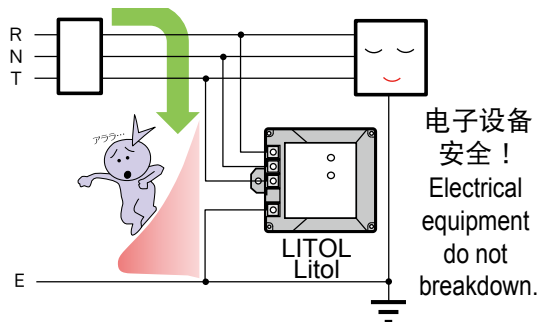
无 LITOL
No Litol



雷电电涌的能量直接到达电子设备等，导致半导体部件的破坏等，引发故障。
The energy of the lightning surge reaches the electric equipment directly, leading to malfunction such as destruction of semiconductor parts.

The effect of Litol

有 LITOL
With Litol



LITOL是一个开关，平时开启，仅在雷电入侵的瞬间关闭。

Litol is like a switch, normally open and closes only at the moment lightning surge is applied.

●LITOL将雷电电涌的异常电压限制在想要保护的设备的耐压等级以下，防止设备损坏。

●Litol (LTP) limits the abnormal voltage of induced lightning surge to below the withstand voltage level of the equipment to be protected, and prevents destruction of equipment.

编带及包装

Taping·Packing

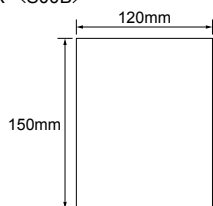
■ 包装数量及包装形式 Packing quantity · Packing form

形式 Form	CSA20, CSA30: 数量 CSA20, CSA30/Unit quantity	CSA70, CDA70: 数量 CSA70, CDA70/Unit quantity	FA44: 数量 FA44/Unit quantity	FA55: 数量 FA55/Unit quantity	DSA: 数量 DSA/Unit quantity	DA53: 数量 DA53/Unit quantity
散袋装 Bulk packing in plastic bag	B type : 500个/袋 B type : 500pcs/bag				A type : 100个/袋 A type : 100pcs/bag 05F25 : 100个/袋 05F25 : 100pcs/bag	B type : 100个/袋 B type : 100pcs/bag E15E : 100个/袋 E15E : 100pcs/bag E25E : 100个/袋 E25E : 100pcs/bag
轴向编带 (箱装) Axial taping (in box)			A22F : 800个/箱 A22F : 800pcs/box	A22F : 500个/箱 A22F : 500pcs/box		A22F : 500个/箱 A22F : 500pcs/box
径向编带 (箱装) Radial taping (in box)			G04F : 1000个/箱 G04F : 1000pcs/box H06F : 1200个/箱 H06F : 1200pcs/box H06G : 1200个/箱 H06G : 1200pcs/box	G04F : 1000个/箱 G04F : 1000pcs/box H06F : 1000个/箱 H06F : 1000pcs/box		
SMD编带 (卷装) SMD taping (in reel)	T type : 2000个/卷 T type : 2000pcs/reel					

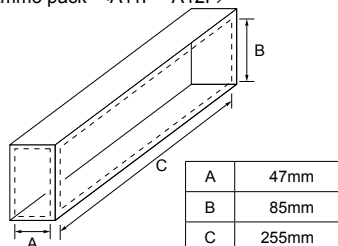
形式 Form	DSP: 数量 DSP/Unit quantity	高电压DSP: 数量 High voltage DSP/Unit quantity	DSS: 数量 DSS/Unit quantity	高电压DSS: 数量 High voltage DSS/Unit quantity	DE37: 数量 DE37/Unit quantity	DSAZR, DSANR, DSAHR: 数量 DSAZR, DSANR, DSAHR/Unit quantity
散袋装 Bulk packing in plastic bag			S00B : 200个/袋 S00B : 200pcs/bag			DSAZR, DSANR : 200个/箱 DSAZR, DSANR : 200pcs/box DSADR : 100个/箱 DSADR : 100pcs/box
轴向编带 (箱装) Axial taping (in box)	A11F : 2000个/箱 A11F : 2000pcs/box A21F : 2000个/箱 A21F : 2000pcs/box A12F : 1000个/箱 A12F : 1000pcs/box A22F : 1000个/箱 A22F : 1000pcs/box		A21F : 1000个/箱 A21F : 1000pcs/box A12F : 1000个/箱 A12F : 1000pcs/box A22F : 1000个/箱 A22F : 1000pcs/box		A21F : 1000个/箱 A21F : 1000pcs/box A12F : 1000个/箱 A12F : 1000pcs/box A22F : 1000个/箱 A22F : 1000pcs/box	
轴向编带 (卷装) Axial taping (in reel)	A21R : 4000个/卷 A21R : 4000pcs/reel A22R : 3000个/卷 A22R : 3000pcs/reel		A21R : 3000个/卷 A21R : 3000pcs/reel A22R : 3000个/卷 A22R : 3000pcs/reel			
径向编带 (箱装) Radial taping (in box)	C04F : 2000个/箱 C04F : 2000pcs/box		C04F : 2000个/箱 C04F : 2000pcs/box		D04F : 2000个/箱 (DE37-272M以上的产品除外) D04F : 2000pcs/box (Except more than DE37-272M)	
径向编带 (卷装) Radial taping (in reel)	C04R : 3000个/卷 C04R : 3000pcs/reel					

※ 有上述以外的包装要求时，请与我公司协商。
Please consult us for the packing form except the above.

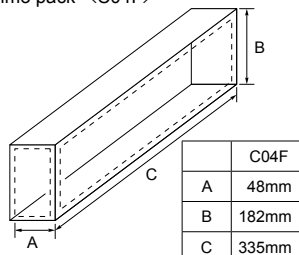
散袋装 <S00B>
Bulk <S00B>



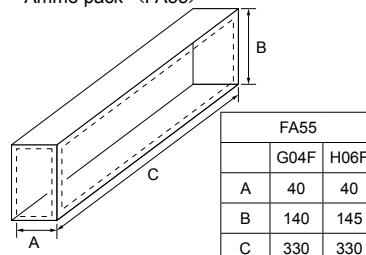
扁平包装 <A11F · A12F>
Ammo pack <A11F · A12F>



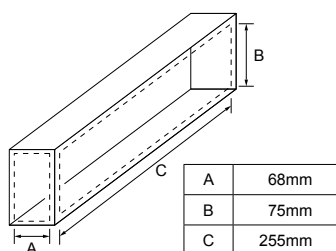
扁平包装 <C04F>
Ammo pack <C04F>



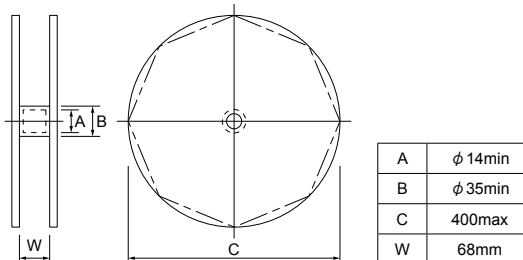
扁平包装 <FA55>
Ammo pack <FA55>



扁平包装 <A21F · A22F>
Ammo pack <A21F · A22F>



卷盘包装 <A21R · A22R>
Reel <A21R · A22R>



包装袋
<CSA20, CSA30>

Bulk
<CSA20, CSA30>

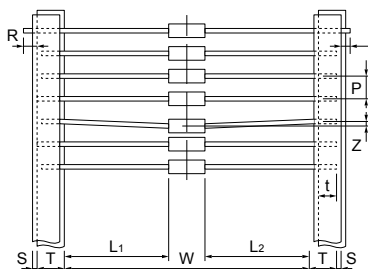


编带及包装

Taping·Packing

■ 编带 Taping

轴向编带 Axial taping



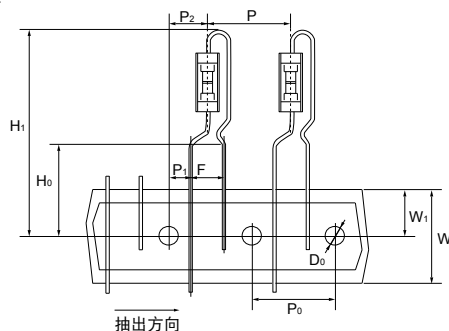
记 号 Symbol	轴向编带 Axial Taping(mm)			
	A11	A21	A12	A22
W	26.0 $\begin{smallmatrix} +1.5 \\ -0.0 \end{smallmatrix}$	52.0 $\begin{smallmatrix} +2.0 \\ -1.0 \end{smallmatrix}$	26.0 $\begin{smallmatrix} +1.5 \\ -0.0 \end{smallmatrix}$	52.0 $\begin{smallmatrix} +2.0 \\ -1.0 \end{smallmatrix}$
P	5.0±0.5		10.0±0.5	
L ₁ -L ₂	1以下	1max.	1以下	1max.
T	6.0±1.0			
Z	1.0以下 1.0max.	1.2以下 1.2max.	1.0以下 1.0max.	1.2以下 1.2max.
R	端子不得露出编带。 Lead wire must not project tape.			
t	3.2以上 3.2min.			
S	0.8以下 0.8max.			

径向编带：C04F

不适应高电压 DSP、高电压 DSS 系列及超过 DE37-272M 以上规格产品。

Radial taping:C04F

High voltage DSP, high voltage DSS and more than DE37-272M is not provided in this form.



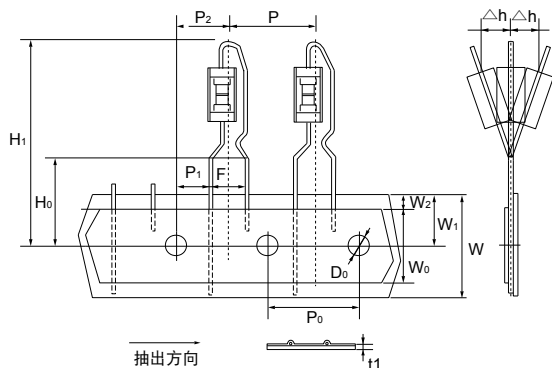
记号 Symbol	径向编带 C04F Radial Taping C04F (mm)
P	12.7 $\pm$ 1.0
P ₀	12.7 $\pm$ 0.3
P ₁	3.85 $\pm$ 0.50
P ₂	6.35 $\pm$ 1.30
F	5.0 $\pm$ 0.5
W	18.0 $+1.0$ -0.5
W ₁	9.0 $\pm$ 0.5
H ₀	16.0 $\pm$ 0.5
H ₁	32.2以下 (32.2max.)
D ₀	ϕ 4.0 $\pm$ 0.2

径向编带：D04F

不适应高电压 DSP、高电压 DSS 系列及超过 DE37-272M 以上规格产品。

Radial taping:D04F

High voltage DSP, high voltage DSS and more than DE37-272M is not provided in this form.



记号 Symbol	径向编带 D04F Radial Taping D04F (mm)
P	12.7 $\pm$ 1.0
P ₀	12.7 $\pm$ 0.3
P ₁	3.85 $\pm$ 0.50
P ₂	6.35 $\pm$ 1.00
F	5.0 $\pm$ 0.5
W	18.0 $+1.0$ -0.5
W ₀	13.0 $\pm$ 0.5
W ₁	9.0 $\pm$ 0.5
W ₂	3.0max.
H ₀	16.0 $\pm$ 0.5
D ₀	4.0 $\pm$ 0.2
Δh	2.0max.
H ₁	31.0max.
t ₁	0.6 $\pm$ 0.3

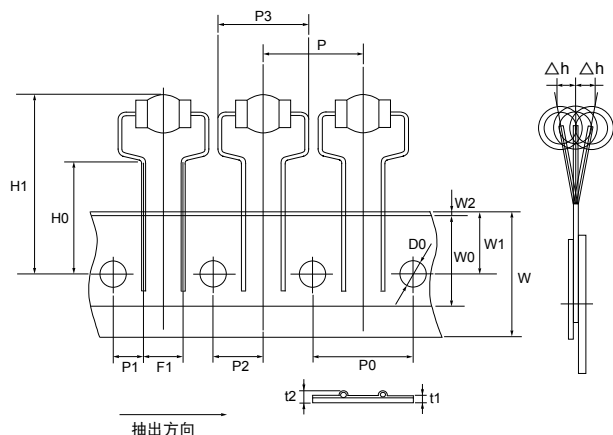
编带及包装

Taping·Packing

■ 编带 Taping

径向编带 : G04 * /H06 *

Radial taping:G04 * /H06 *



FA55/FA44 系列

FA55 / FA44 Series

记号 Symbol	径向编带 Radial Taping (mm)		
	G04F	H06F	H06G
P	12.7±1.0	15.0±1.0	
P ₀	12.7±0.3	15.0±0.3	
P ₁	3.85±0.50	3.75±0.5	
P ₂	6.35±1.00	7.5±1.0	
P ₃	11.0±1.0	11.0±1.0	
F ₁	5.0±0.5	7.5±1.0	
W	18.0 ^{+1.0} _{-0.5}	18.0 ^{+1.0} _{-0.5}	
W ₀	13.0±0.5	13.0±0.5	
W ₁	9.0±0.5	9.0±0.5	
W ₂	3.0max.	3.0max.	
H ₀	16.0±2.0	16.0±2.0	19.0±1.0
D ₀	4.0±0.2	4.0±0.2	
Δh	2.0max.	2.0max.	
H ₁	FA55(28.5max.) FA44(28.0max.)	FA55(28.5max.) FA44(28.0max.)	FA44(30.0max.)
t ₁	0.6±0.3	0.6±0.3	
t ₂	1.5max.	1.5max.	

DE37 系列

DE37 Series

记号 Symbol	径向编带 Radial Taping (mm)				
	G04F	G04G	H06F	H06G	H06K
P	12.7±1.0		15.0±1.0		
P ₀	12.7±0.3		15.0±0.3		
P ₁	3.85±0.50		3.75±0.5		
P ₂	6.35±1.00		7.5±1.0		
F ₁	5.0±0.5		7.5±0.5		
W	18.0 ^{+1.0} _{-0.5}		18.0 ^{+1.0} _{-0.5}		
W ₀	13.0±0.5		13.0±0.5		
W ₁	9.0±0.5		9.0±0.5		
W ₂	3.0max.		3.0max.		
H ₀	17.0±1.0	19.0±1.0	17.0±1.0	19.0±1.0	19.0±1.0
D ₀	4.0±0.2		4.0±0.2		
Δh	2.0max.		2.0max.		
H ₁	28.0max	30.0max	28.0max	30.0max	30.0max
t ₁	0.6±0.3		0.6±0.3		
t ₂	1.5max.		1.5max.		

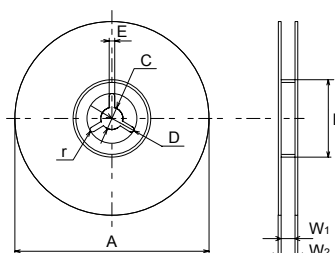
编带及包装

Taping·Packing

■ SMD 编带 (CSA20 系列)
SMD Taping (CSA20 Series)

包装记号 Packing code	系列 Series	包装数量 Packing Qty
T	CSA20	2,000

卷盘 Reel



塑料卷盘 (标准型)

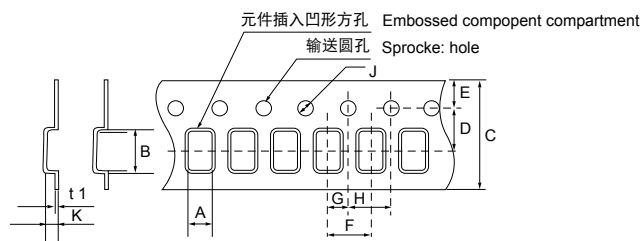
Reel

单位 unit (mm)

A	B	C	D
$\phi 180_{-3}^{+0}$	$\phi 60_{+1}^{+0}$	$\phi 13.0 \pm 0.2$	$R10.5 \pm 0.4$
E	W ₁	W ₂	r
2.0 ± 0.5	9.0 ± 0.3	11.4 ± 1.0	0.5

塑料载带

Plastic carrier tape



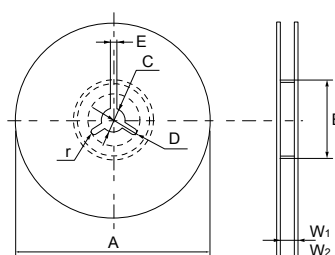
单位 unit (mm)

形状 mark	A	B	C	D	E	F
CSA20	1.45 ± 0.10	2.2 ± 0.1	8.0 ± 0.2	3.50 ± 0.05	1.75 ± 0.10	4.0 ± 0.1
形状 mark	G	H	J	K	t1	
CSA20	2.00 ± 0.05	4.0 ± 0.1	$\phi 1.5 \pm 0.1$	1.42 ± 0.05	0.25 ± 0.05	

D, G 的尺寸为每个袋子的中心值
Dimensions of D and G are the values at center of the hole.■ SMD 编带 (CSA30 系列)
SMD Taping (CSA30 Series)

包装记号 Packing code	系列 Series	包装数量 Packing Qty
T	CSA30	2,000

卷盘 Reel



塑料卷盘 (标准型)

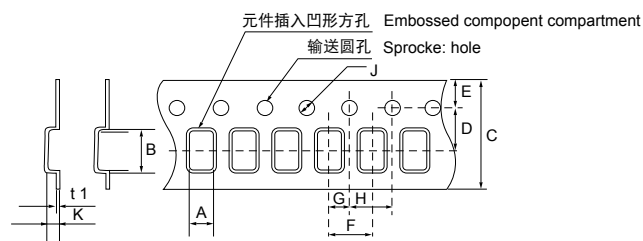
Reel

单位 unit (mm)

A	B	C	D
$\phi 180_{-3}^{+0}$	$\phi 60_{+1}^{+0}$	$\phi 13.0 \pm 0.2$	$R10.5 \pm 0.4$
E	W ₁	W ₂	r
2.0 ± 0.5	9.0 ± 0.3	11.4 ± 1.0	0.5

塑料载带

Plastic carrier tape



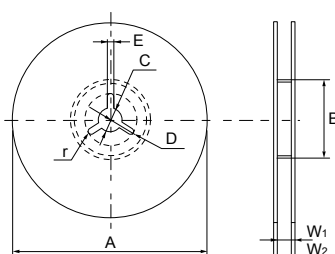
单位 unit (mm)

形状 mark	A	B	C	D	E	F
CSA30	1.9 ± 0.2	3.5 ± 0.2	8.0 ± 0.2	3.50 ± 0.05	1.75 ± 0.10	4.0 ± 0.1
形状 mark	G	H	J	K	t1	
CSA30	2.00 ± 0.05	4.0 ± 0.1	$\phi 1.5 \pm 0.1$	1.8 ± 0.2	0.25 ± 0.05	

D, G 的尺寸为每个袋子的中心值
Dimensions of D and G are the values at center of the hole.■ SMD 编带 (CSA70/CDA70 系列)
SMD Taping (CSA70/CDA70 Series)

包装记号 Packing code	系列 Series	包装数量 Packing Qty
T	CSA70 CDA70	2,000

卷盘 Reel



塑料卷盘 (标准型)

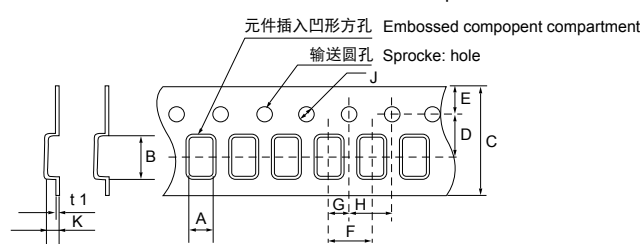
Reel

单位 unit (mm)

A	B	C	D
$\phi 360$ 以下	$\phi 50.0$ 以上	$\phi 13.0 \pm 0.2$	21 ± 0.8
E	W ₁	W ₂	r
2.0 ± 0.5	13.0 ± 0.5	18.4 以下	1.0

塑料载带

Plastic carrier tape



单位 unit (mm)

形状 mark	A	B	C	D	E	F
CSA70 CDA70	3.6 ± 0.1	4.3 ± 0.1	12.0 ± 0.1	5.50 ± 0.05	1.75 ± 0.10	8.0 ± 0.1
形状 mark	G	H	J	K	t1	
CSA70 CDA70	2.00 ± 0.05	4.0 ± 0.1	$\phi 1.55 \pm 0.05$	2.5 ± 0.1	0.30 ± 0.05	

D, G 的尺寸为每个袋子的中心值
Dimensions of D and G are the values at center of the hole.



NTC热敏电阻的基本特性

NTC热敏电阻是指具有负温度系数的热敏电阻。本产品是使用单一高纯度材料，具有接近理论密度结构的高性能陶瓷。因此，在实现小型化的同时，还具有电阻值、温度特性波动小、对各种温度变化响应快的特点，可进行高度灵敏、高精度的检测。本公司提供各种形状、特性的小型、高可靠性产品，可满足广大客户的应用需求。

■电阻—温度特性

热敏电阻的电阻—温度特性可近似地用式1表示。

式1 (eq1)

$$R = R_0 \exp \left\{ B \left(\frac{1}{T} - \frac{1}{T_0} \right) \right\}$$

R : 温度T (K) 时的电阻值

R₀ : 温度T₀ (K) 时的电阻值

B : B值

$$T(K) = t(^{\circ}C) + 273.15$$

但实际上，热敏电阻的B值并不是恒定的，其变化大小因材料构成而异，最大甚至可达5K/°C。

因此，在较大的温度范围内应用式1时，将与实测值之间存在一定误差。

此处，若将式1中的B值用式2所示的温度函数计算时，则可降低与实测值之间的误差，可认为近似相等。

式2 (eq2)

$$B_T = CT^2 + DT + E$$

上式C、D、E为常数。

另外，因生产条件不同造成的B值的波动会引起常数E发生变化，但常数C、D不变。因此，在算入B值的波动量时，只需考虑常数E即可。

●常数C、D、E的计算

常数C、D、E可由4点的（温度、电阻值）数据（T₀, R₀）（T₁, R₁）（T₂, R₂）（T₃, R₃），通过式3~6计算。

首先由式3根据T₁、T₂、T₃的电阻值求出B₁、B₂、B₃，然后代入以下各式。

式3 (eq3)

$$B_n = \frac{\ln(R_n / R_0)}{\frac{1}{T_n} - \frac{1}{T_0}}$$

式4 (eq4)

$$C = \frac{(B_1 - B_2)(T_2 - T_3) - (B_2 - B_3)(T_1 - T_2)}{(T_1 - T_2)(T_2 - T_3)(T_1 - T_3)}$$

式5 (eq5)

$$D = \frac{B_1 - B_2 - C(T_1 + T_2)(T_1 - T_2)}{(T_1 - T_2)}$$

式6 (eq6)

$$E = B_1 - DT_1 - CT_1 \cdot T_1$$

NTC Thermistor basic properties

Negative temperature coefficient(NTC)thermistors are manufactured from high purity and uniform materials to achieve a construction of near-perfect theoretical density. This ensures small size, tight resistance and B-value tolerances, and fast response to temperature variations, making a highly sensitive and precision component. Thermistor is available in a wide range of types to meet your demands for small size and high reliability.

■Resistance - temperature characteristic

The resistance and temperature characteristics of a thermistor can be approximated by equation 1.

R : resistance at absolute temperature T(K)

R₀ : resistance at absolute temperature T₀(K)

B : B value

$$T(K) = t(^{\circ}C) + 273.15$$

The B value for the thermistor characteristics is not fixed, but can vary by as much as 5K/°C according to the material composition. Therefore equation 1 may yield different results from actual values if applied over a wide temperature range.

By taking the B value in equation 1 as a function of temperature, as shown in equation 2, the difference with the actual value can be minimized.

C, D, and E are constants.

The B value distribution caused by manufacturing conditions will change the constant E, but will have no effect on constants C or D. This means, when taking into account the distribution of B value, it is enough to do it with the constant E only.

●Calculation for constants C, D and E

Using equations 3~6, constants C, D and E can be determined through four temperature and resistance value data points (T₀, R₀), (T₁, R₁), (T₂, R₂) and (T₃, R₃).

With equation 3, B₁, B₂ and B₃, can be determined from the resistance values for T₀ and T₁, T₂, T₃ and then substituted into the equations below.

热敏电阻

THERMISTOR

●电阻值计算例

试根据电阻—温度特性表，求 25℃时的电阻值为 5 (KΩ)，B 值偏差为 50 (K) 的热敏电阻在 10℃~30℃ 的电阻值。

●步骤

①根据电阻—温度特性表，求常数 C、D、E。

$$T_0=25+273.15 \quad T_1=10+273.15 \quad T_2=20+273.15 \quad T_3=30+273.15$$

②代入 $B_T = CT^2 + DT + E + 50$ ，求 B_T 。

③将数值代入 $R = 5 \exp \{B_T (1/T - 1/298.15)\}$ ，求 R 。

※ $T: 10+273.15 \sim 30+273.15$

●Example

Using a resistance-temperature characteristic chart, the resistance value over the range of 10°C~30°C is sought for a thermistor with a resistance of 5kΩ and a B value deflection of 50K at 25°C.

●Process

①Determine the constants C, D and E from the resistance-temperature chart.

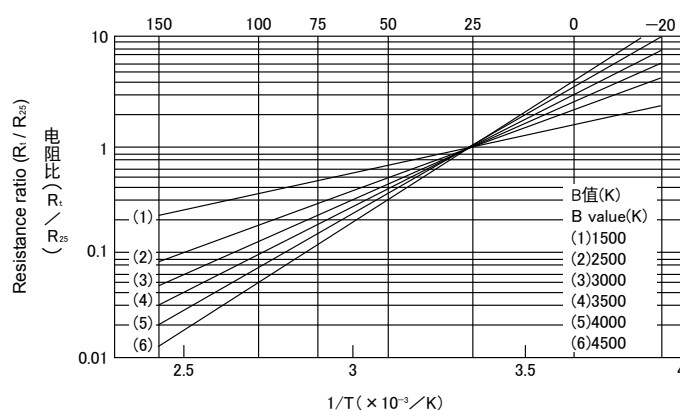
② $B_T = CT^2 + DT + E + 50$; substitute the value into equation and solve for B_T

③ $R = 5 \exp \{B_T (1/T - 1/298.15)\}$; substitute the values into equation and solve for R

※ $T: 10+273.15 \sim 30+273.15$

●电阻—温度特性图如图1所示。

●Results of plotting the resistance-temperature characteristics are shown figure 1



电阻—温度特性 (图-1)
RESISTANCE-TEMPERATURE CHARACTERISTIC (Fig. 1)

■电阻温度系数

所谓电阻温度系数 (α) 是指在任意温度下温度变化 1℃ (K) 时的零负载电阻变化率。

将式1微分，可得知电阻温度系数 (α) 与 B 值的关系。

$$\alpha = \frac{1}{R} \cdot \frac{dR}{dT} \times 100 = -\frac{B}{T^2} \times 100 \quad (\%/^{\circ}\text{C})$$

这里 α 前的负号表示当温度上升时零负载电阻降低。

■Resistance temperature coefficient

The resistance-temperature coefficient (α) is defined as the rate of change of the zero-power resistance associated with a temperature variation of 1°C at any given temperature.

The relationship between the resistance-temperature coefficient (α) and the B value can be obtained by differentiating equation 1 above.

A negative value signifies that the rated zero-power resistance decreases

■散热系数

散热系数 (δ) 是指在热平衡状态下，热敏电阻元件通过自身发热使其温度上升 1℃ 时所需的功率。

在热平衡状态下，热敏电阻的温度 T_1 ，环境温度 T_2 及消耗功率 P 之间关系如下式所示。

$$\delta = \frac{P}{T_1 - T_2} \quad (\text{mW}/^{\circ}\text{C})$$

$$\text{※ } (P = I^2 \cdot R = I \cdot V)$$

产品目录记载值为下列测定条件下的典型值。

①25℃静止空气中。

②轴向引脚、径向引脚型在出厂状态下测定。

■Heat dissipation constant

The dissipation constant (δ) indicates the power necessary for increasing the temperature of the thermistor element by 1°C through self-heating in a heat equilibrium.

Applying a voltage to a thermistor will cause an electric current to flow, leading to a temperature rise in the thermistor. This "intrinsic heating" process is subject to the following relationship among the thermistor temperature T_1 , ambient temperature T_2 , and consumed power P .

Measuring conditions for all parts in this catalog are as follows:

①Room temp is 25°C

②Axial and radial leaded parts were measured in their shipping condition.

热敏电阻

THERMISTOR



■最大功率

在额定环境温度下，可连续负载运行的功率最大值。
个别产品规格书上可能记载为以往的名称“额定功率”。

产品目录记载值是以25℃为额定环境温度，由下式计算出的值。

(式) 额定功率=散热系数×(最高使用温度-25)

■容许运动功率

这是使用热敏电阻进行温度检测或温度补偿时，自身发热产生的温度上升容许值所对应功率。(JIS中未定义。)容许温度上升t℃时，容许运行功率可由下式计算。

(式) 容许运行功率=t×散热系数

■根据环境温度变化的热时间常数

只在零负载状态下，当热敏电阻的环境温度发生急剧变化时，热敏电阻元件产生最初温度与最终温度两者温度差的63.2%的温度变化所需的时间。

热敏电阻的环境温度从T₁变为T₂时，经过时间t与热敏电阻的温度T之间存在以下关系。

$$T = (T_1 - T_2) \exp(-t/\tau) + T_2 \cdots \cdots (3.1)$$

$$= (T_2 - T_1) \{1 - \exp(-t/\tau)\} + T_1 \cdots \cdots (3.2)$$

常数τ称为热响应时间常数。

上式中，若令t=τ时，则(T-T₁)/(T₂-T₁)≒0.632。

换言之，如上面的定义所述，热敏电阻产生初始温度差63.2%的温度变化所需的时间即为热响应时间常数。

经过时间t与热敏电阻温度变化率的关系如下表所示。

t	$\frac{T-T_1}{T_2-T_1}$
τ	63.2%
2τ	86.5%
3τ	95.0%
4τ	98.2%
5τ	99.4%

表-1 热响应时间常数 Table-1 Thermal Time Constant

产品目录记录值为下列测定条件下的典型值。

- ①静止空气中环境温度从50℃至25℃变化时，热敏电阻的温度变化至34.2℃所需时间。
- ②轴向引脚、径向引脚型在出厂状态下测定。

另外应注意，散热系数、热响应时间常数随环境温度、组装条件而变化。

■Maximum power dissipation

The power rating is the maximum power for a continuous load at the rated temperature.

In the detail specification, it is likely to write by "Power rating" that is a past name.

For parts in this catalog, the value is calculated from the following formula using 25℃ as the ambient temperature.

(formula) Rated power=heat dissipation constant × (maximum operating temperature-25℃)

■Permissible operating power

Definition : The power to reach the maximum operating temperature through self heating when using a thermistor for temperature compensation or as a temperature sensor. (No JIS definition exists.) The Permissible operating power, when t℃ is the permissible temperature rise, can be calculated using the following formula.

(formula) Permissible operating power= t×heat dissipation constant

■Thermal time constant

A constant expressed as the time for the temperature at the element of a thermistor, with no load applied, to change to 63.2% of the difference between their initial and final temperatures, during a sudden change in the surrounding temperature.

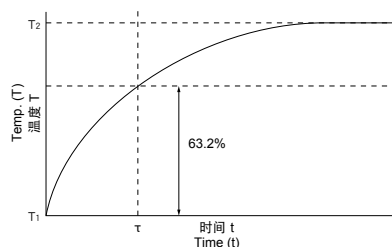
When the surrounding temperature of the thermistor changes from T₁ to T₂, the relation between the elapsed time t and the thermistors temperature T can then be expressed by the following equation. by ambient temperature change.

The constant τ is called the heat dissipation constant.

If t=τ, the equation becomes : (T-T₁)/(T₂-T₁)≒0.632

In other words, the above definition states that the thermal time constant is the time it takes for the temperature of the thermistor to change by 63.2% of its initial temperature difference.

The rate of change of the thermistor temperature versus time is shown in table 1.



Measuring conditions for parts in this catalog are as follows:

- ①Part is moved from a 50℃ environment to a still air 25℃ environment until the temperature of the thermistor reaches 34.2℃.
- ②Axial and radial leaded parts are measured in their shipping form.

Please note, the thermal dissipation constant and thermal time constant will vary according to environment and mounting conditions

热敏电阻

THERMISTOR

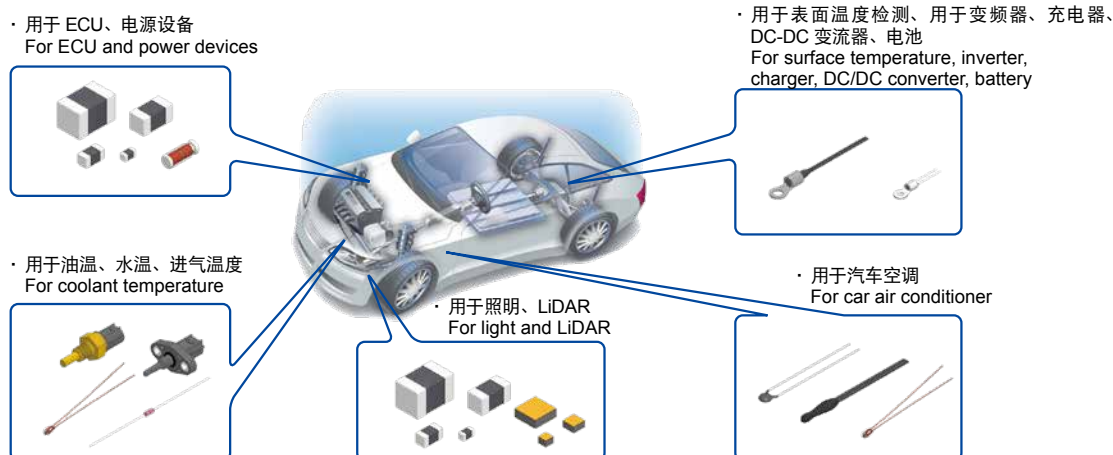
■用途

- 硬盘驱动器的温度补偿电路
- CD、DVD 刻录用光学头
- PC 主板的温度监视
- DC 冷却风扇的转速控制
- 手机功率放大器增益的温度补偿
- 液晶驱动电压的控制（对比度补偿）
- 电池组的温度控制、温度保护
- 光通信LD 模块的温度控制
- MOS-FET 的过热保护
- DVC/DSC 的温度补偿
- 温度补偿型晶体振荡器（TCXO）的温度补偿
- 打印机的温度探测 控制电路用
- 车载音响的温度补偿及过热探测
- LED 部分的温度探测 控制电路用
- 车载ECU 控制电路用

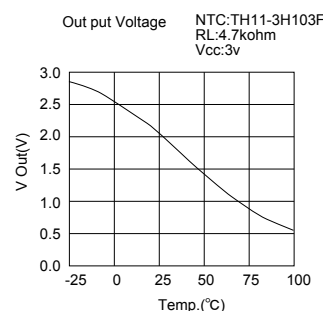
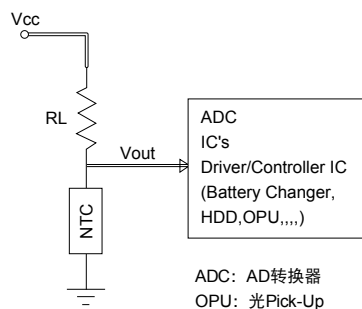
■Applications

- Temperature compensated circuit in HDD
- Optical pickup for CD/DVD writing,
- CPU periphery temperature monitoring circuits,
- Temperature detection for DC power supply
- Gain Stabilization for mobile phone
- Temperature compensation of display contrast in LCD
- Temperature detection of battery cells
- Optical communication related equipment Laser transmission circuit temperature compensation
- Temperature detection for MOS-FET
- DVC/DSC devices; Auto-focus circuits, plunger peripheral circuits, battery pack temperature control circuits
- Temperature Compensation of Crystal Oscillators (TCXO)
- Temperature compensation for ink-viscosity (Inkjet Printer)
- Temperature compensation and detection for Car-audio equipment
- Temperature compensation of LED parts (Ex LED head light)
- Temperature compensation of car ECU unit

■车载用途示例 Applications for automotive



■温度检测电路 Temperature detection circuit

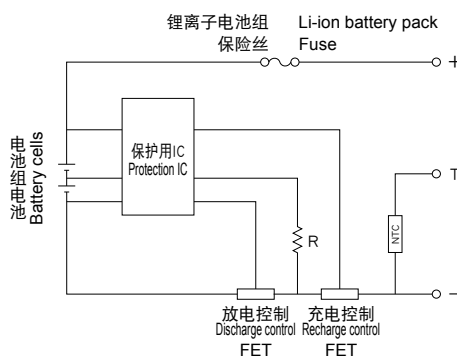


■典型用途

- 电池组
在用于移动电子设备等的电池组（二次电池）上，使用高精度型的片状热敏电阻作为电路保护元件。

■Typical Applications

- Battery pack
Chip thermistor with high precision is used for the protection circuit inside the battery pack for mobile electronic devices.



热敏电阻

THERMISTOR

使用注意事项

■ 使用电压

若使用的电压过高，则因传感器自身发热，不仅无法正确检测出周围的温度，而且可能会引起异常高温，损坏传感器。因此，对于异常电压，请采取保护电路等安全措施。

■ 使用环境

请勿在下列环境中使用，否则将导致特性劣化，严重时甚至会造成故障(或人身伤害事故)。

- 1) 直接接触水的场所、因湿度大可能会导致结露的场所
- 2) 有腐蚀性、还原性气体(硫化氢、亚硫酸、氯气、氨气等)的环境
- 3) 有挥发性、可燃性气体的环境
- 4) 多尘的场所
- 5) 减压或加压后的空气中
- 6) 暴露于盐水、油、药液、有机溶剂的场所
- 7) 振动或冲击过大的场所
- 8) 其他与上述环境相当的场所

请务必在成品上附加适当的故障保护功能，确保在产品出现异常或不良状况时，可防止二次灾害的发生。

■ 安全预防

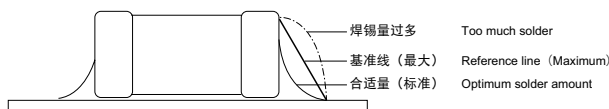
医疗、宇航、核电等设备上使用的电子部件，与用于一般民用设备的相比，常常要求更高的可靠性，因为这些设备一旦发生故障，经常会导致人身危害或引起巨大的社会损失。考虑用于此类用途时，请务必事先与本公司联系。

■ 保存环境

- 1) 保存温度、湿度
环境温度：-10~40℃
相对湿度：70%RH以下(不可结露)
- 2) 保存期限
购入后12个月以内
- 3) 开封后的处理
请在打开最小包装后密封保存或置于有干燥剂的密封容器内保存。
- 4) 保存场所
请保存在无阳光直射及特殊气体(硫磺和氯气等)的场所。

■ 安装条件

- 1) 设计时确保焊盘的大小左右均等。
- 2) 焊剂请使用低活性(卤化物含有率在0.2wt%以下)的产品。
- 3) 焊接后进行超音波清洗时，输出过大会引起主板共振，由此可能会造成主板破裂或端子电极粘着力下降。故此，推荐按以下条件进行清洗。
频率：40kHz以下
输出：20W/L以下
清洗时间：5分钟以内
- 4) 焊锡量越多，本产品所受的机械应力就越大，过大时可能会造成破裂。请以焊料圆角的上端为芯片厚度的1/2~2/3为标准调整焊料的涂抹量。



- 5) 若在传感器焊接于主板上后的工序或处理中主板发生弯曲，传感器可能会发生破裂。因此在设计零部件配置时，应尽量避免施加会使主板产生挠曲的过大应力。
- 6) 进行主板分割时，由于传感器受到机械应力的作用，故请采取适当的传感器配置和分割方法。

■ 其他注意事项

请务必在规定的温度范围内使用，否则可能会导致材质及特性劣化。若对本产品规格有任何不明之处，请与本公司联系。

Caution in Chip Thermistor usage

■ Operating Power

Thermistors shall not be operated in excess of the specified Maximum permissible electrical power" in the specifications. Unless the thermistors are operated under the specified Maximum permissible electrical power, it may cause burnout and damage due to thermal run away. Fully check safety and reliability in your circuit.

■ Operating Conditions

Do not use the thermistors under the following conditions because all these factors deteriorate the thermistor characteristics or cause failures and burnout.

- 1) Wet or humid locations
- 2) Corrosive or deoxidizing gas (Hydrogen sulfide, Sulfurous acid, Chloride and ammonia, etc.)
- 3) Volatile or flammable gas
- 4) Dusty conditions
- 5) Under high pressure or low pressure
- 6) locations with salt water, oils, chemical liquids or organic solvents
- 7) Strong vibrations or mechanical impact
- 8) Other places similar to the hazardous conditions mentioned above

Be sure to provide an appropriate fail-safe function on your product to prevent secondary damages that may be caused by the failure of our product.

■ Safety precaution

Our products shall be used for general purpose applications required for consumer type electronics equipment. Strongly recommend to consult us before use of our product, if you think about use of our products on the following special applications with high level of safety. Medical equipment, Aircraft equipment, Aerospace equipment, Atomic power equipment, etc.

■ Storage conditions

- 1) Storage temperature and humidity
Temperature : -10 to +40 degree C
Humidity : less than 70%RH(not dewing condition)
- 2) Storage term
Use our product within 12 months after delivery.
- 3) Handling after unpacking
After unpacking, reseal products or store them in a sealed package with a dry agent.
- 4) Storage place
Do not store our products in direct sunlight or in corrosive gas(sulfuric acid or chlorine gas, etc.)

■ Soldering and mounting notice

- 1) Use recommended dimensions of lands and the dimensions shall be symmetrical.
- 2) Use rosin-based flux. Do not use strong acid flux with halide content over 0.2wt%.
- 3) Do not use ultrasonic cleaning with too much output to avoid deteriorating the strength of the terminal electrodes or cracking in the solder and/or ceramic bodies of the products. The followings are recommended conditions for ultrasonic cleaning.
Frequency : less than 40 kHz
Output : less than 20 W/L
Cleaning time : less than 5 min
- 4) Too much soldering may cause mechanical stress resulting in cracking. The amount of solder shall be controlled according to the standard height of fillet shown below. As a guide, top edge of the solder fillet is about 1/2 to 2/3 of the chip thickness.

- 5) Choose a mounting position that minimizes the stress imposed on the chip during bending of the board.
- 6) Since dividing or breaking of the PC boards may cause mechanical stress in the thermistors on the PC boards, it shall be done carefully by using a jig to prevent the product from mechanical damage.

■ Other caution

Use this product within the specified temperature range. Feel free to contact us when you have any questions regarding our products.



■ 热敏传感器使用注意事项

请严格遵守以下事项，否则可能会造成热敏传感器损坏、使用设备损伤或引起误动作。

- 1) 热敏传感器是按不同用途分别进行设计的。若要用于规定以外的用途时，请就使用环境条件与本公司联系洽谈。
- 2) 设计设备时，请进行热敏传感器的贴装评估试验，确认无异常后再使用。
- 3) 请勿在过高的功率下使用热敏传感器。
- 4) 由于自身发热导致电阻值下降时，可能会引起温度检测精度降低、设备功能故障。故使用时请参考散热系数，注意热敏传感器的外加功率及电压。
- 5) 请勿在使用温度范围以外使用。
- 6) 请勿施加超出使用温度范围限制的急剧温度变化。
- 7) 将热敏传感器作为装置的主控制元件单独使用时，为防止事故发生，请务必采取设置“安全电路”、“同时使用具有同等功能的热敏传感器”等周全的安全措施。
- 8) 在有噪音的环境中使用，请采取设置保护电路及屏蔽热敏传感器(包括导线)的措施。
- 9) 在高湿环境下使用护套型热敏传感器时，应采取仅护套头部暴露于环境(水气、湿气中)，而护套开口部不会直接接触到水及蒸气的设计。
如果出现结露时，为了不使这个部位积水，注意开口部向下等安装方法。
- 10) 请勿施加过度的振动、冲击及压力。
- 11) 请勿过度弯曲及拉伸导线。
- 12) 请勿在绝缘部和电极间施加过大的电压。否则，可能会产生绝缘不良现象。
- 13) 配线时应确保导线端部(含连接器)不会渗入“水”、“蒸气”、“电解质”等，否则会造成接触不良。
- 14) 请勿在超出设定范围的腐蚀性气体的环境(Cl_2 、 NH_3 、 SO_x 、 NO_x)以及会接触到电解质、盐水、酸、碱、有机溶剂的场所中使用。
- 15) 金属腐蚀可能会造成设备功能故障，故在选择材质时，应确保金属护套型及螺钉紧固型热敏传感器与安装的金属件之间不会产生接触电位差。

使用时若有其他不明之处，请垂询本公司销售人员。

■ Thermistor sensor precautions

Follow the below guidelines to prevent damage to the sensor and damage or improper functioning of the surrounding electronics this is used in.

- 1) Sensors are for specific applications. Contact us if you intend to use beyond these specifications.
- 2) Perform soldering performance testing during design of your product to confirm it operates as expected.
- 3) Do not exceed the rated electric power.
- 4) Use less current and voltage than the dissipation current and voltage rating, or self-heating will cause the resistance to decrease and could cause a permanent change in the sensor or cause equipment to malfunction.
- 5) Do not exceed operating temperature range.
- 6) Do not subject to radical temperature changes which exceed operating temperature range.
- 7) To prevent accidents if using a single sensor as the main control, always make a "safety circuit" by making another circuit in parallel or take similar preventive measures.
- 8) Install a protective circuit or shield the sensor (including the lead wire) if the environment has electrical noise.
- 9) If you intend to use the case type sensor under the high humidity environment, please design it as follows: only the protected case tip may be exposed to the environment (in water and moisture) condition and the opening part of the case may be prevented from touching water and steam directly to the utmost.
If the dew condensation water occurs, please be careful about attaching method. For example, it is necessary to lower the opening part in order not to stay in this part.
- 10) Do not excessively vibrate or accelerate or shock the parts.
- 11) Avoid the excessive pulling or bending of the lead wire.
- 12) Do not impress an excessive voltage between the insulated part and the electrode. This might cause the insulation malfunction.
- 13) Because of causing of the poor contact, consider wiring in order not such as "water", "steam" and "electrolyte" to invade the terminal part of the lead wire (including the connector).
- 14) Do not design for an application where it will be used in a corrosive gas atmosphere (Cl_2 , NH_3 , SO_x , NO_x), or contacts an electrolyte, brine water, acid, alkaline or organic solvents.
- 15) Since it is possible to poor function of the equipment because of the metal corrosion, you need to consider the material in order not the sensor of the metal case type or the screw equipped type to cause the contact potential difference between the metal to be attached.

If you have any other questions about usage which isn't covered here, please contact our sales.

板载式热敏电阻

ON BOARD THERMISTOR



表面贴装型

采用本公司独特的材料技术、产品设计技术及生产流程，开发生产的高精度、超小型化表面贴装型热敏电阻。

具有应对各种需求的形状和特性的品种。

SMD Type

Using our company's unique materials, product design, and manufacturing technologies, we have been able to produce smaller and increasingly precise surface mount thermistors.

This has enabled us to create a full line of parts to meet various characteristic and size requirements.

■贴片式热敏电阻的种类 Chip thermistors

贴片式热敏电阻的种类 Chip-type thermistors

	贴片型 Chip size	形状 Type	使用温度范围 Operating temperature range	电阻值(R ₂₅)容许偏差(%) Resistance value tolerance at 25℃					B值(B _{25/50})容许偏差(%) B value tolerance 25/50℃				电阻值范围 Resistance range	页码 page
TZ系列 TZSeries	1005 (0402)	05	-40~+150℃	±0.5	±1				±0.3				10k~100kΩ	66
TD系列 TDSeries	1005 (0402)	05			±1	±2	±3			±1			10k~100kΩ	66
	1608 (0603)	11			±1	±2	±3			±1			10k~470kΩ	68
TX系列 TXSeries	0603 (0201)	03	-40~+125℃	±0.5	±1				±0.3				10k~100kΩ	66
	1005 (0402)	05		±0.5	±1				±0.3				10k~100kΩ	66
TH系列 THSeries	0603 (0201)	03			±1	±2	±3			±1			10k~100kΩ	66
	1005 (0402)	05			±1	±2	±3			±1			6.8k~470kΩ	67
	1608 (0603)	11			±1	±2	±3			±1			10k~1MΩ	68
	2012 (0805)	20			±1	±2	±3			±1			10k~100kΩ	70
TN系列 TNSeries	1005 (0402)	05						±5	±10		±3		1k~2MΩ	67
	1608 (0603)	11						±5	±10		±3		2k~470kΩ	68
	1608 (0603)	10						±5	±10		±3	±5	30~150kΩ	69
	2012 (0805)	20						±5	±10		±3	±5	40~10MΩ	70
TC系列 TCSeries	1005 (0402)	05						±5	±10		±3		30~1MΩ	67
	1608 (0603)	10						±5	±10		±3	±5	50~4.7kΩ	69
	2012 (0805)	20						±5	±10		±3	±5	40~15kΩ	70

圆板式热敏电阻的种类 MELF-type thermistors

	贴片型 Chip size	形状 Type	使用温度范围 Operating temperature range	电阻值(R ₂₅)容许偏差(%) Resistance value tolerance at 25℃					B值(B _{25/50})容许偏差(%) B value tolerance 25/50℃				电阻值范围 Resistance range	页码 page
MN系列 MN Series	φ 1.35×3.5	18	-40~+150℃				±3	±5				±3	2k~150kΩ	71
MH系列 MH Series					±1	±2	±3				±1			71

薄片式热敏电阻的种类 Flake-type thermistors

	贴片型 Chip size	形状 Type	使用温度范围 Operating temperature range	电阻值(R ₂₅)容许偏差(%) Resistance value tolerance at 25℃					B值(B _{25/50})容许偏差(%) B value tolerance 25/50℃				电阻值范围 Resistance range	页码 page
VH系列 VHSeries	0.22□	02	-40~+125℃				±3			±1			10kΩ、100kΩ	72, 73
	0.32□	05			±1	±2	±3			±1				72, 73
	0.60□	10			±1	±2	±3			±1				72, 73

板载式热敏电阻产品介绍

板载式热敏电阻产品有表面贴装用的晶片型与圆板型、以及主板贴装用的轴向引脚型与径向引脚型产品，可适合各种安装。

Introduction of on-board thermistors

The on board thermistors are available in several different packages, from chip and melf for surface mount, to axial and radial leaded for through the hole mounting.

■板载式热敏电阻的种类 On-board thermistors

系列名 Series	品名称 Product name	使用温度范围 Operating temperature range	引线 Lead wire	电阻值范围 Resistance range	页码 page
GA/GH13系列	轴向引脚型热敏电阻 Axial leaded	-40~+300℃ (+150℃)	电镀或镀锡 Ni-plating or Tin plating	2k~100kΩ	74
GA/GH20系列				2k~100kΩ	75
GR15/25系列	径向引脚型热敏电阻 Radial leaded	-40~+300℃ (+150℃)	杜美丝 Dumet wire	2.18k~1.38MΩ	76
CN/CH25系列		-40~+110℃	镀锡涂层铜镍合金线 Tin coating Cu-Ni wire	500~500kΩ	77
RH18系列		-40~+110℃	聚氨酯被覆线 Polyuretha covered wire	10k~100kΩ	78
BM18/22/38系列		-40~+100℃	聚氨酯被覆线 Polyuretha covered wire	10kΩ	79
BN35系列		-20~+80℃	PVC被覆线 PVC covered wire	10k~2.2MΩ	78

板载式热敏电阻

ON BOARD THERMISTOR



■ 型号构成 Part number system

TN05	-	3T	103	J	B
系列名 Series		标称B值 B Value	标称电阻值 Resistance ①	电阻值容许偏差 Resistance tolerance ②	包装形式 Packing form ③

①显示25℃的电阻值，前2位表示电阻值的有效数字、第3位表示有效数字后的零的个数。单位是（Ω）

Resistance value at 25℃ is expressed in ohms. First two digits are significant and the last digit is the numbers of zeros following.

②电阻值容许偏差
Resistance tolerance.

③包装形式
Packing form

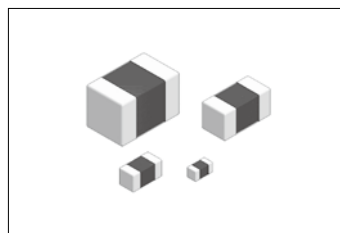
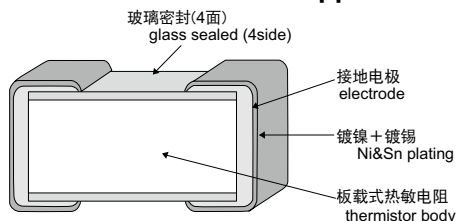
记号 Code	D	F	G	H	J	K	L
电阻值容许偏差 Resistance tolerance	±0.5%	±1%	±2%	±3%	±5%	±10%	±15%
B值容许偏差 B Value tolerance	$\pm 0.3\% = \begin{matrix} \text{=====} \pm 1\% \text{=====} \\ \text{=====} \pm 3\% \text{=====} \\ \text{=====} \pm 5\% \text{=====} \end{matrix}$						

记号 code	包装形式 Packing form	包装数量 Packing Q'ty	相应品种 Type
B	散装 Bulk	100	GR25系列 (GR25 Series)
		200	MN/MH18系列 (MN/MH18 Series) GA/GH13系列 (GA/GH13 Series) GA/GH20系列 (GA/GH20 Series) CN/CH25系列 (CN/CH25 Series) GR15系列 (GR15 Series)
		500	贴片式热敏电阻 Chip thermistor
C	塑料盘装 Plastic tray	400	薄片式热敏电阻 Flake thermistor
S	片材 Seat	400	薄片式热敏电阻 Flake thermistor
T	纸带装 Paper taping	4,000	贴片式热敏电阻 Chip thermistor 11系列 (11Series) (0603Series) 10系列 (10Series) (0603Series) 20系列 (20Series) (0805Series)
R		10,000	贴片式热敏电阻 Chip thermistor 05系列 (05Series) (0402Series)
D		15,000	贴片式热敏电阻 Chip thermistor 03系列 (03Series) (0201Series)
P	塑料包装 Plastic taping	2,000	MN/MH18系列 (MN/MH18 Series)
F	扁平包装 Flat pack	2,000	GA/GH13系列 (GA/GH13 Series) GA/GH20系列 (GA/GH20 Series)

贴片式热敏电阻系列

CHIP TYPE THERMISTOR SERIES

■ 结构及外观 Structure and appearance



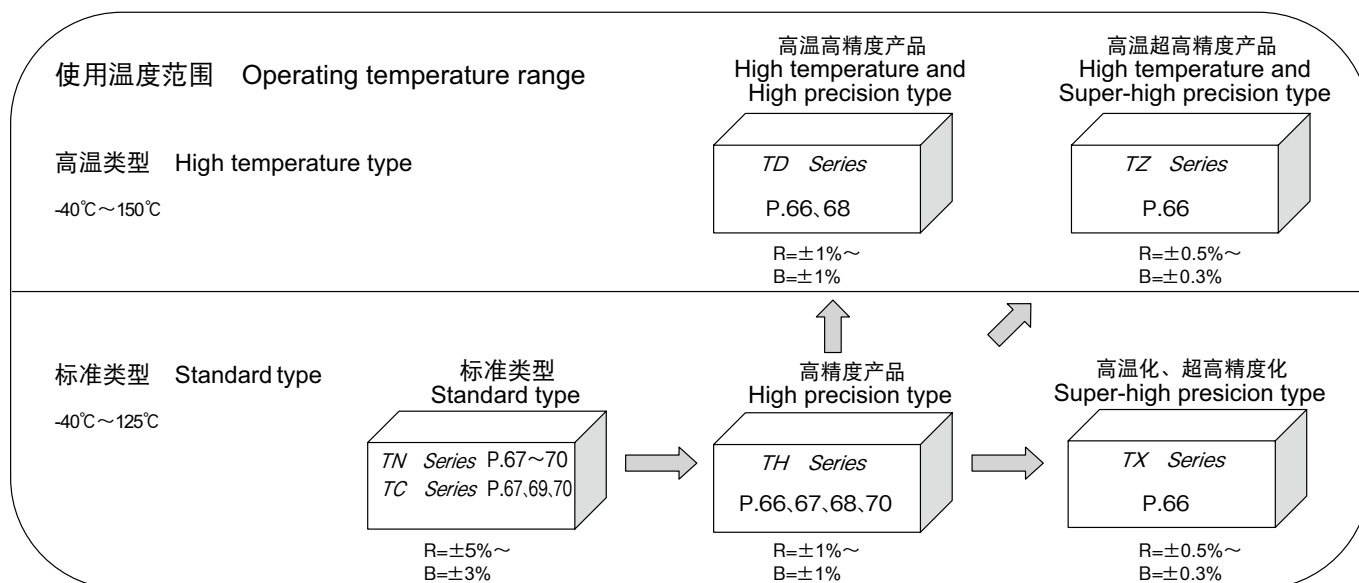
■ 特点

- 通过独有的原材料，实现超高精度的温度测量
- 通过独有的4面玻璃密封做法，实现较高的可靠性（机械应力强、耐环境性、耐变换电阻性能优异）
- 优异的静电放电耐压性能
- 优异的高频率特性
- 优异的焊接性能、耐热性能
- 可用于150℃高温
- 完全不含铅(Pb)产品
- RoHS指定产品

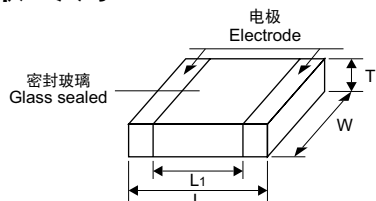
■ Features

- Provides ultra-accurate temperature measurement of its own raw materials
- High reliability by unique four-sided glass coating. (Excellent mechanical strength, environmental resistance and migration resistance.)
- Strong against electrostatic discharge
- Excellent high frequency characteristics.
- Excellent solderability and heat resistance.
- High temperature(150℃)
- Lead-free
- RoHS Compliance

■ 产品系列 Product lineup

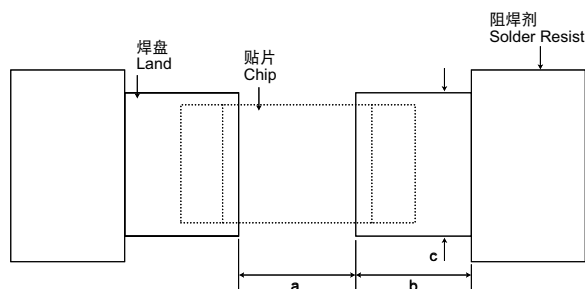


■ 形状・尺寸 Dimensions



形状 Type	贴片型 Chip size	L	W	T	L1
03	0603 (0201)	0.60±0.04	0.30±0.04	0.30±0.04	0.10min.
05	1005 (0402)	1.00±0.15	0.5 ^{+0.05} _{-0.10}	0.5 ^{+0.05} _{-0.10}	0.20min.
10	1608 (0603)	1.60±0.15	0.80±0.15	0.95max.	0.30min.
11	1608 (0603)	1.60±0.15	0.80±0.15	0.70max.	0.30min.
20	2012 (0805)	2.00±0.20	1.25±0.20	1.25max.	0.40min.

■ 推荐焊盘布局 Recommended land pattern



焊盘尺寸 Land size (mm)

形状 Type	贴片型 Chip size	a	b	c
03	0603 (0201)	0.25	0.25	0.30
05	1005 (0402)	0.30	0.60	0.60
10	1608 (0603)	0.70	0.75	0.85
11	1608 (0603)	0.70	0.75	0.85
20	2012 (0805)	1.00	0.90	1.40

■ 焊接条件请参见第 94 页。 Please refer to page 94 for soldering conditions.

贴片式热敏电阻系列

CHIP TYPE THERMISTOR SERIES

使用例：高精度化

◇大的温度范围内，实现电阻值的高精度化

Applications : High precision

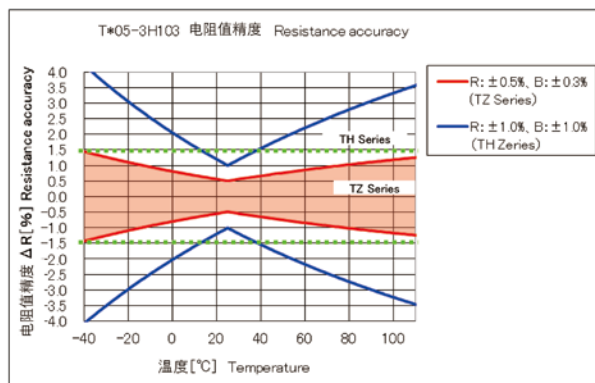
Under the Wide-temperature range High resistance accuracy

	高精度产品 High precision type	超高精度产品 Super-high precision type
品名 type	TH05-3H103F[R,B]	TZ05-3H103D[R,B]
尺寸 size	1.00×0.50×0.50 mm	
R25	10kΩ±1%	10kΩ±0.5%
B25/50	3380K±1%	3380K±0.3%

热敏电阻电阻值精度 The accuracy of thermistors

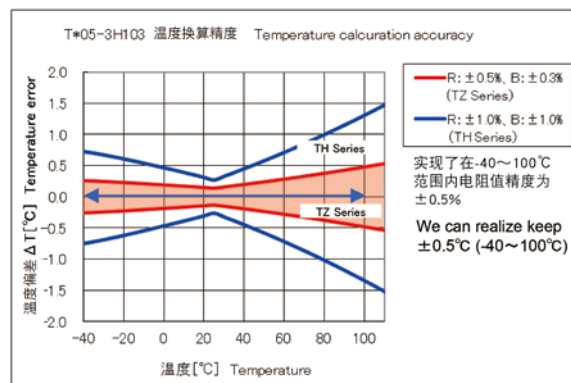
实现了在-40℃～+125℃范围内电阻值精度为±1.5% (以往产品：±4.2%)

Resistance accuracy ±1.5% (at -40℃～+125℃) (Previous ±4.2%)

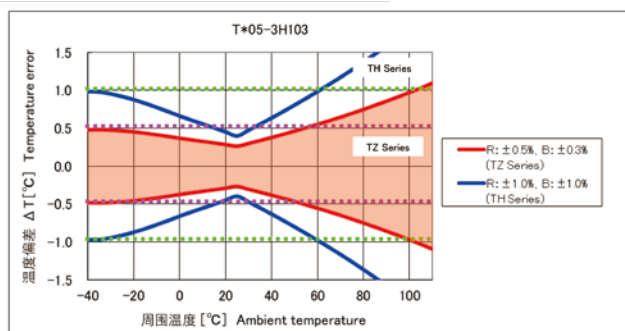
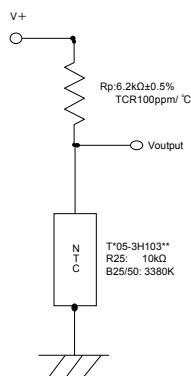


温度换算精度±0.5℃ (-40℃～+100℃)

Temperature calculation accuracy ±0.5℃ (at -40℃～+100℃)

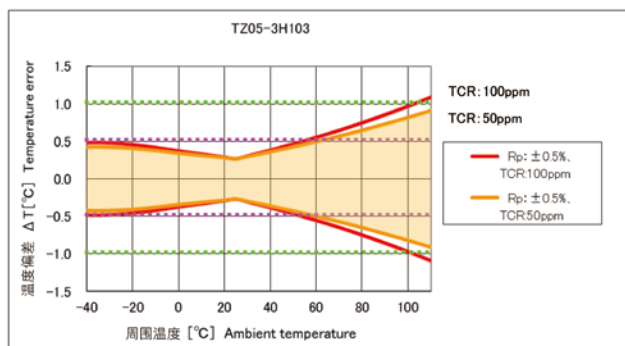
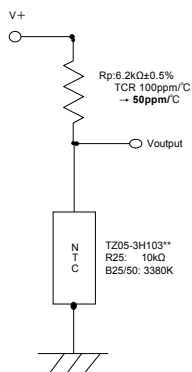


应用例 (电路全体的温度探测) Exam(The detected temperature error of the circuit board)



如连接电阻使用超高精度型，更加扩大温度范围。

If you also use ultra high accuracy resistance, You could use in more wide temperature range.



	连接电阻 Connect resistance	TCR:100ppm	TCR:100ppm	TCR:50ppm
	热敏电阻 Thermistor	TH05-3H103F (以往产品 / Previous)	TZ05-3H103D	TZ05-3H103D
温度偏差 Temperature error	±0.5℃以内 within ±0.5℃	+20℃～+30℃	-40℃～+50℃	-40℃～+60℃
	±1.0℃以内 within ±1.0℃	-40℃～+60℃	-40℃～+100℃	-40℃～+120℃

贴片式热敏电阻系列

CHIP TYPE THERMISTOR SERIES

所有产品端子电极都是镀锡规格。

关于 RT 数据，本公司的主页上已有详细介绍，敬请查阅。

以下系列均为支持 UL 规格 (UL1434) 的产品。(File No.E318570)

※安全标准认定条件可能会被修订。关于最新的认定状况，请确认各标准的主页。

- TH05 系列
- TN05 系列
- TC05 系列
- TH11 系列
- TN11 系列
- TN10 系列
- TH20 系列
- TN20 系列

以下系列可以对应特殊规格，详情请咨询本公司。

- TZ05 系列
- TX05 系列
- TD05 系列
- TD11 系列

Chip-thermistor are all Tin plating

Regarding R-Tdata, Please refer to our web site

It is available in a UL1434 approved type. (File No. E318570)

※ Safety standard certification conditions may be revised. Would you confirm the web site of each standard about the latest information.

- TH05 Series
- TN05 Series
- TC05 Series
- TH11 Series
- TN11 Series
- TN10 Series
- TH20 Series
- TN20 Series

Please consult us for availability of non-standard items

- TZ05 Series
- TX05 Series
- TD05 Series
- TD11 Series

0603 (0201inch) 系列 0603(0201inch) Series

TX03系列(超高精度产品) TX03Series (Ultra accuracy type)



系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R25)容许偏差(%) Resistance tolerance at 25℃				B值(B25/50)容许偏差(%) B value tolerance				电阻值 R25 resistance	B值 B25/50 B value	B值 B25/85 B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation
TX03	3H103 **	-40~+125℃	±0.5	±1			±0.3				10kΩ	3,380K	3,395K	150	1.5
	4F104 **		±0.5	±1			±0.3				100kΩ	4,250K	4,230K		

TH03系列(高精度产品) TH03Series (High accuracy type)



系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R25)容许偏差(%) Resistance tolerance at 25℃				B值(B25/50)容许偏差(%) B value tolerance				电阻值 R25 resistance	B值 B25/50 B value	B值 B25/85 B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation
TH03	3H103 **	-40~+125℃		±1	±2	±3		±1			10kΩ	3,380K	3,395K	150	1.5
	4F104 **			±1	±2	±3		±1			100kΩ	4,250K	4,230K		

1005 (0402inch) 系列 1005(0402inch) Series

TZ05系列(高温超高精度产品) TZ05Series (High temperature, Ultra accuracy type)200



系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R25)容许偏差(%) Resistance tolerance at 25℃				B值(B25/50)容许偏差(%) B value tolerance				电阻值 R25 resistance	B值 B25/50 B value	B值 B25/85 B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation
TZ05	3H103 **	-40~+150℃	±0.5	±1			±0.3				10kΩ	3,380K	3,423K	300	2.4
	4F104 **		±0.5	±1			±0.3				100kΩ	4,250K	4,254K		

TD05系列(高温高精度产品) TD05Series (High temperature, High accuracy type)



系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R25)容许偏差(%) Resistance tolerance at 25℃				B值(B25/50)容许偏差(%) B value tolerance				电阻值 R25 resistance	B值 B25/50 B value	B值 B25/85 B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation
TD05	3H103 **	-40~+150℃		±1	±2	±3		±1			10kΩ	3,370K	3,413K	300	2.4
	3L104 **			±1	±2	±3		±1			100kΩ	3,540K	3,578K		
	4H104 **			±1	±2	±3		±1			100kΩ	4,360K	4,360K		
	4F104 **			±1	±2	±3		±1			100kΩ	4,250K	4,254K		

TX05系列(超高精度产品) TX05Series (Ultra accuracy type)



系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R25)容许偏差(%) Resistance tolerance at 25℃				B值(B25/50)容许偏差(%) B value tolerance				电阻值 R25 resistance	B值 B25/50 B value	B值 B25/85 B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation
TX05	3H103 **	-40~+125℃	±0.5	±1			±0.3				10kΩ	3,380K	3,423K	240	2.4
	4F104 **		±0.5	±1			±0.3				100kΩ	4,250K	4,254K		

贴片式热敏电阻系列

CHIP TYPE THERMISTOR SERIES

■ 1005(0402inch) 系列 1005(0402inch)series

TH05系列(高精度产品) TH05Series (High accuracy type)



系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R25)容许偏差(%) Resistance tolerance at 25°C				B值(B25/50)容许偏差(%) B value tolerance				电阻值 R25 resistance	B值 B25/50 B value	B值 B25/85 B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/°C) Heat dissipation
TH05	3N682 **	-40~+125°C		±1	±2	±3					6.8kΩ	3,670K	3,657K	240	2.4
	3H103 **			±1	±2	±3					10kΩ	3,370K	3,413K		
	3I103 **			±1	±2	±3					10kΩ	3,380K	3,435K		
	3T103 **			±1	±2	±3					10kΩ	3,820K	3,792K		
	4B153 **			±1	±2	±3					15kΩ	4,030K	3,985K		
	3V223 **			±1	±2	±3					22kΩ	3,900K	3,898K		
	3N333 **			±1	±2	±3					33kΩ	3,650K	3,725K		
	4B333 **			±1	±2	±3					33kΩ	4,050K	4,038K		
	3I473 **			±1	±2	±3					47kΩ	3,400K	3,490K		
	4B473 **			±1	±2	±3					47kΩ	4,050K	4,057K		
	3J683 **			±1	±2	±3					68kΩ	3,450K	3,492K		
	3K803 **			±1	±2	±3					80kΩ	3,500K	3,543K		
	3L104 **			±1	±2	±3					100kΩ	3,540K	3,578K		
	4B104 **			±1	±2	±3					100kΩ	4,050K	4,093K		
	4F104 **			±1	±2	±3					100kΩ	4,250K	4,254K		
	4H104 **			±1	±2	±3					100kΩ	4,360K	4,360K		
	3M154 **			±1	±2	±3					150kΩ	3,620K	3,668K		
	3W474 **			±1	±2	±3					470kΩ	3,940K	3,998K		
	4K474 **			±1	±2	±3					470kΩ	4,500K	4,541K		
	4R474 **			±1	±2	±3					470kΩ	4,700K	4,715K		

TN05系列(标准产品) TN05Series (Standard type)



系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R25)容许偏差(%) Resistance tolerance at 25°C				B值(B25/50)容许偏差(%) B value tolerance				电阻值 R25 resistance	B值 B25/50 B value	B值 B25/85 B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/°C) Heat dissipation
TN05	3C102 **	-40~+125°C				±5 ±10				±3	1.0kΩ	3,110K	3,124K	240	2.4
	3E152 **					±5 ±10				±3	1.5kΩ	3,200K	3,214K		
	3G222 **					±5 ±10				±3	2.2kΩ	3,290K	3,298K		
	3H302 **					±5 ±10				±3	3.0kΩ	3,370K	3,375K		
	3I332 **					±5 ±10				±3	3.3kΩ	3,420K	3,425K		
	3L472 **					±5 ±10				±3	4.7kΩ	3,530K	3,528K		
	3N682 **					±5 ±10				±3	6.8kΩ	3,670K	3,657K		
	3H103 **					±5 ±10				±3	10kΩ	3,370K	3,413K		
	3T103 **					±5 ±10				±3	10kΩ	3,820K	3,792K		
	4B153 **					±5 ±10				±3	15kΩ	4,030K	3,985K		
	3V223 **					±5 ±10				±3	22kΩ	3,900K	3,898K		
	3N333 **					±5 ±10				±3	33kΩ	3,650K	3,725K		
	4B473 **					±5 ±10				±3	47kΩ	4,050K	4,057K		
	3I473 **					±5 ±10				±3	47kΩ	3,400K	3,490K		
	3J683 **					±5 ±10				±3	68kΩ	3,450K	3,492K		
	3K803 **					±5 ±10				±3	80kΩ	3,500K	3,543K		
	3L104 **					±5 ±10				±3	100kΩ	3,540K	3,578K		
	3M154 **					±5 ±10				±3	150kΩ	3,620K	3,668K		
	4W205 **					±5 ±10				±3	2MΩ	4,950K	4,984K		

TC05系列(标准产品) TC05Series (Standard type)



系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R25)容许偏差(%) Resistance tolerance at 25°C				B值(B25/50)容许偏差(%) B value tolerance				电阻值 R25 resistance	B值 B25/50 B value	B值 B25/85 B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/°C) Heat dissipation
TC05	2S300 **	-40~+125°C				±5 ±10				±3	30Ω	2,750K	2,769K	240	2.4
	2S400 **					±5 ±10				±3	40Ω	2,750K	2,769K		
	2S680 **					±5 ±10				±3	68Ω	2,750K	2,769K		
	2S820 **					±5 ±10				±3	82Ω	2,750K	2,769K		
	2S101 **					±5 ±10				±3	100Ω	2,750K	2,769K		
	2S121 **					±5 ±10				±3	120Ω	2,750K	2,769K		
	2S151 **					±5 ±10				±3	150Ω	2,750K	2,769K		
	4C202 **					±5 ±10				±3	2.0kΩ	4,100K	4,048K		
	4C272 **					±5 ±10				±3	2.7kΩ	4,100K	4,048K		
	4C302 **					±5 ±10				±3	3.0kΩ	4,100K	4,048K		
	4C332 **					±5 ±10				±3	3.3kΩ	4,100K	4,048K		
	4K104 **					±5 ±10				±3	100kΩ	4,500K	4,541K		
	4K224 **					±5 ±10				±3	220kΩ	4,500K	4,541K		
	4V105 **					±5 ±10				±3	1MΩ	4,900K	4,909K		

贴片式热敏电阻系列

CHIP TYPE THERMISTOR SERIES

■ 1608 (0603inch) 系列 1608(0603inch) Series

TD11系列(高温高精度产品) ※厚度0.7mmMax TD11Series (High temperature, High accuracy type) ※Thickness 0.7mmMAX.



系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R25)容许偏差(%) Resistance tolerance at 25℃				B值(B25/50)容许偏差(%) B value tolerance				电阻值 R25 resistance	B值 B25/50 B value	B值 B25/85 B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation
TD11	3H103 **	-40~+150℃		±1	±2	±3			±1		10kΩ	3,370K	3,423K	375	3.0
	4C153 **			±1	±2	±3			±1		15kΩ	4,110K	4,053K		
	4B473 **			±1	±2	±3			±1		47kΩ	4,050K	4,067K		
	3M104 **			±1	±2	±3			±1		100kΩ	3,580K	3,620K		
	4H104 **			±1	±2	±3			±1		100kΩ	4,360K	4,360K		
	3R154 **			±1	±2	±3			±1		150kΩ	3,680K	3,723K		
	3S224 **			±1	±2	±3			±1		220kΩ	3,760K	3,806K		
	3U334 **			±1	±2	±3			±1		330kΩ	3,850K	3,904K		
	3W474 **			±1	±2	±3			±1		470kΩ	3,940K	3,998K		

TH11系列(高精度产品) ※厚度0.7mmMax TH11Series (High accuracy type) ※Thickness 0.7mmMAX.



系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R25)容许偏差(%) Resistance tolerance at 25℃				B值(B25/50)容许偏差(%) B value tolerance				电阻值 R25 resistance	B值 B25/50 B value	B值 B25/85 B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation
TH11	3H103 **	-40~+125℃		±1	±2	±3			±1		10kΩ	3,370K	3,423K	300	3.0
	3V103 **			±1	±2	±3			±1		10kΩ	3,910K	3,876K		
	4C153 **			±1	±2	±3			±1		15kΩ	4,110K	4,053K		
	3T223 **			±1	±2	±3			±1		22kΩ	3,820K	3,841K		
	3K333 **			±1	±2	±3			±1		33kΩ	3,480K	3,617K		
	3J473 **			±1	±2	±3			±1		47kΩ	3,440K	3,481K		
	4B473 **			±1	±2	±3			±1		47kΩ	4,050K	4,067K		
	4B503 **			±1	±2	±3			±1		50kΩ	4,050K	4,067K		
	3K683 **			±1	±2	±3			±1		68kΩ	3,500K	3,534K		
	3M104 **			±1	±2	±3			±1		100kΩ	3,590K	3,628K		
	3W104 **			±1	±2	±3			±1		100kΩ	3,950K	4,000K		
	4H104 **			±1	±2	±3			±1		100kΩ	4,360K	4,360K		
	4I104 **			±1	±2	±3			±1		100kΩ	4,392K	4,390K		
	3R154 **			±1	±2	±3			±1		150kΩ	3,680K	3,723K		
	3S224 **			±1	±2	±3			±1		220kΩ	3,760K	3,806K		
	3U334 **			±1	±2	±3			±1		330kΩ	3,850K	3,904K		
	3W474 **			±1	±2	±3			±1		470kΩ	3,940K	3,998K		
	4V105 **			±1	±2	±3			±1		1MΩ	4,900K	4,909K		

TN11系列(标准产品) ※厚度0.7mmMax TN11Series (Standard type) ※Thickness 0.7mmMAX.



系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R25)容许偏差(%) Resistance tolerance at 25℃				B值(B25/50)容许偏差(%) B value tolerance				电阻值 R25 resistance	B值 B25/50 B value	B值 B25/85 B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation
TN11	3I202 **	-40~+125℃				±5 ±10			±3		2kΩ	3,400K	3,399K	300	3.0
	3H103 **					±5 ±10			±3		10kΩ	3,370K	3,423K		
	3V103 **					±5 ±10			±3		10kΩ	3,910K	3,876K		
	4C153 **					±5 ±10			±3		15kΩ	4,110K	4,053K		
	3T223 **					±5 ±10			±3		22kΩ	3,820K	3,841K		
	3K333 **					±5 ±10			±3		33kΩ	3,480K	3,617K		
	3J473 **					±5 ±10			±3		47kΩ	3,440K	3,481K		
	4B473 **					±5 ±10			±3		47kΩ	4,050K	4,067K		
	3K683 **					±5 ±10			±3		68kΩ	3,500K	3,534K		
	3M104 **					±5 ±10			±3		100kΩ	3,590K	3,628K		
	4H104 **					±5 ±10			±3		100kΩ	4,360K	4,360K		
	3R154 **					±5 ±10			±3		150kΩ	3,680K	3,723K		
	3S224 **					±5 ±10			±3		220kΩ	3,760K	3,806K		
	3U334 **					±5 ±10			±3		330kΩ	3,850K	3,904K		
	3W474 **					±5 ±10			±3		470kΩ	3,940K	3,998K		

贴片式热敏电阻系列

CHIP TYPE THERMISTOR SERIES

■ 1608(0603inch) 系列 1608(0603inch)series

TN10系列(标准产品) TN10Series (Standard type)



系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R25)容许偏差(%) Resistance tolerance at 25℃				B值(B25/50)容许偏差(%) B value tolerance				电阻值 R25 resistance	B值 B25/50 B value	B值 B25/85 B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation	
TN10	2D300 **	-40~+125℃				±5	±10			±3	±5	30Ω	2,150K	2,155K	300	3.0
	2E400 **					±5	±10			±3	±5	40Ω	2,200K	2,292K		
	2F500 **					±5	±10			±3	±5	50Ω	2,250K	2,279K		
	2H680 **					±5	±10			±3	±5	68Ω	2,350K	2,380K		
	2R101 **					±5	±10			±3	±5	100Ω	2,700K	2,724K		
	2S121 **					±5	±10			±3	±5	120Ω	2,750K	2,769K		
	2T151 **					±5	±10			±3	±5	150Ω	2,800K	2,813K		
	2V221 **					±5	±10			±3	±5	220Ω	2,900K	2,901K		
	3A331 **					±5	±10			±3	±5	330Ω	3,000K	3,025K		
	3C471 **					±5	±10			±3	±5	470Ω	3,100K	3,125K		
	3D681 **					±5	±10			±3	±5	680Ω	3,150K	3,181K		
	3F102 **					±5	±10			±3	±5	1kΩ	3,250K	3,260K		
	3I152 **					±5	±10			±3	±5	1.5kΩ	3,400K	3,399K		
	3K222 **					±5	±10			±3	±5	2.2kΩ	3,500K	3,499K		
	3N332 **					±5	±10			±3	±5	3.3kΩ	3,650K	3,633K		
	3S472 **					±5	±10			±3	±5	4.7kΩ	3,750K	3,750K		
	3V682 **					±5	±10			±3	±5	6.8kΩ	3,900K	3,868K		
	4C103 **					±5	±10			±3	±5	10kΩ	4,100K	4,048K		
	3U153 **					±5	±10			±3	±5	15kΩ	3,850K	3,870K		
	3K223 **					±5	±10			±3	±5	22kΩ	3,500K	3,643K		
	3J333 **					±5	±10			±3	±5	33kΩ	3,450K	3,494K		
	3K473 **					±5	±10			±3	±5	47kΩ	3,500K	3,537K		
	3M683 **					±5	±10			±3	±5	68kΩ	3,600K	3,645K		
	3R104 **					±5	±10			±3	±5	100kΩ	3,700K	3,743K		
	3S154 **					±5	±10			±3	±5	150kΩ	3,750K	3,797K		

TC10系列(标准产品) TC10Series (Standard type)



系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R25)容许偏差(%) Resistance tolerance at 25℃					B值(B25/50)容许偏差(%) B value tolerance				电阻值 R25 resistance	B值 B25/50 B value	B值 B25/85 B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation	
TC10	2S500 **	-40~+125℃					±5	±10			±3	±5	50Ω	2,750K	2,769K	300	3.0
	2R820 **						±5	±10			±3	±5	82Ω	2,700K	2,724K		
	2S101 **						±5	±10			±3	±5	100Ω	2,750K	2,769K		
	2V181 **						±5	±10			±3	±5	180Ω	2,900K	2,901K		
	3K182 **						±5	±10			±3	±5	1.8kΩ	3,500K	3,499K		
	4C202 **						±5	±10			±3	±5	2kΩ	4,100K	4,048K		
	4C302 **						±5	±10			±3	±5	3kΩ	4,100K	4,048K		
	4C472 **						±5	±10			±3	±5	4.7kΩ	4,100K	4,048K		

贴片式热敏电阻系列

CHIP TYPE THERMISTOR SERIES

■ 2012 (0805inch) 系列 2012(0805inch) Series

TH20系列(高精度产品) TH20Series (High accuracy type)



系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R25)容许偏差(%) Resistance tolerance at 25°C				B值(B25/50)容许偏差(%) B value tolerance				电阻值 R25 resistance	B值 B25/50 B value	B值 B25/85 B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/°C) Heat dissipation
TH20	3H103 **	-40~+125°C		±1	±2	±3			±1		10kΩ	3,370K	3,489K	500	5.0
	3V103 **			±1	±2	±3			±1		10kΩ	3,924K	3,914K		
	3W303 **			±1	±2	±3			±1		30kΩ	3,950K	3,991K		
	3M503 **			±1	±2	±3			±1		50kΩ	3,590K	3,628K		
	3W503 **			±1	±2	±3			±1		50kΩ	3,950K	4,030K		
	3R803 **			±1	±2	±3			±1		80kΩ	3,700K	3,743K		
	3S104 **			±1	±2	±3			±1		100kΩ	3,760K	3,806K		

TN20系列(标准产品) TN20Series (Standard type)



系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R25)容许偏差(%) Resistance tolerance at 25℃					B值(B25/50)容许偏差(%) B value tolerance				电阻值 R25 resistance	B值 B25/50 B value	B值 B25/85 B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation
TN20	2G400 **	-40~+125℃				±5	±10			±3	±5	40 Ω	2,300K	2,304K	500	5.0
	2I500 **					±5	±10			±3	±5	50 Ω	2,400K	2,450K		
	2N680 **					±5	±10			±3	±5	68 Ω	2,650K	2,673K		
	2S101 **					±5	±10			±3	±5	100 Ω	2,750K	2,758K		
	2T151 **					±5	±10			±3	±5	150 Ω	2,800K	2,813K		
	2V221 **					±5	±10			±3	±5	220 Ω	2,900K	2,917K		
	3A331 **					±5	±10			±3	±5	330 Ω	3,000K	3,019K		
	3C471 **					±5	±10			±3	±5	470 Ω	3,100K	3,120K		
	3E681 **					±5	±10			±3	±5	680 Ω	3,200K	3,218K		
	3E102 **					±5	±10			±3	±5	1kΩ	3,200K	3,221K		
	3I152 **					±5	±10			±3	±5	1.5kΩ	3,400K	3,403K		
	3K202 **					±5	±10			±3	±5	2kΩ	3,500K	3,469K		
	3S332 **					±5	±10			±3	±5	3.3kΩ	3,750K	3,731K		
	3W472 **					±5	±10			±3	±5	4.7kΩ	3,950K	3,909K		
	4C682 **					±5	±10			±3	±5	6.8kΩ	4,100K	4,044K		
	3H103 **					±5	±10			±3	±5	10kΩ	3,370K	3,489K		
	3K103 **					±5	±10			±3	±5	10kΩ	3,500K	3,544K		
	3V103 **					±5	±10			±3	±5	10kΩ	3,924K	3,914K		
	3N153 **					±5	±10			±3	±5	15kΩ	3,650K	3,695K		
	3S223 **					±5	±10			±3	±5	22kΩ	3,750K	3,786K		
	3W303 **					±5	±10			±3	±5	30kΩ	3,950K	3,991K		
	3T333 **					±5	±10			±3	±5	33kΩ	3,800K	3,839K		
	3U473 **					±5	±10			±3	±5	47kΩ	3,850K	3,894K		
	3W503 **					±5	±10			±3	±5	50kΩ	3,950K	4,030K		
	3N683 **					±5	±10			±3	±5	68kΩ	3,650K	3,690K		
	3R803 **					±5	±10			±3	±5	80kΩ	3,700K	3,743K		
	4C104 **					±5	±10			±3	±5	100kΩ	4,100K	4,141K		
	4D154 **					±5	±10			±3	±5	150kΩ	4,150K	4,195K		
	5A205 **					±5	±10			±3	±5	2MΩ	5,000K	5,043K		
	5G106 **					±5	±10			±3	±5	10MΩ	5,300K	5,390K		

TC20系列(标准产品) TC20Series (Standard type)



系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R25)容许偏差(%) Resistance tolerance at 25℃						B值(B25/50)容许偏差(%) B value tolerance				电阻值 R25 resistance	B值 B25/50 B value	B值 B25/85 B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation
TC20	2S400 **	-40~+125℃					±5	±10			±3	±5	40Ω	2,750K	2,758K	500	5.0
	4C302 **						±5	±10			±3	±5	3.0kΩ	4,100K	4,044K		
	3J153 **							±5	±10			±3	±5	15kΩ	3,450K		

板载式热敏电阻

ON BOARD THERMISTOR

用于电源温度检测

[应对高温]

MN18 / MH181 系列



■特点

- 可在高温下使用。
- 耐环境性能优异。

■特性 Characteristics

MN18 系列 MN18Series

系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R ₂₅)容许偏差(%) Resistance tolerance at 25°C				B值(B _{25/50}) 容许偏差(%) B value tolerance	电阻值 R ₂₅ resistance	B值 B _{25/50} B value	B值 B _{25/85} B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/°C) Heat dissipation
MN18	3G202**	-40~+150°C			±3	±5	±3	2kΩ	3,470K	3,507K	250	2
	3G302**				±3	±5	±3	3kΩ	3,470K	3,507K		
	3G502**				±3	±5	±3	5kΩ	3,470K	3,507K		
	3H103**				±3	±5	±3	10kΩ	3,465K	3,502K		
	6E203**				±3	±5	±3	20kΩ	3,965K	4,016K		
	6P303**				±3	±5	±3	30kΩ	3,948K	3,984K		
	6H503**				±3	±5	±3	50kΩ	3,770K	3,820K		
	3U104**				±3	±5	±3	100kΩ	3,965K	4,038K		
	3U154**				±3	±5	±3	150kΩ	3,965K	4,038K		

※ 关于 R-T 数据, 请参阅本公司主页。

※Regarding R-T data, please refer to our web site.

■特点

- 电阻值精度高, 可实现 B 值的容许偏差为 ±1%。
- 可在高温下使用。
- 耐环境性能优异。

■特性 Characteristics

MH18 系列 MH18Series

系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R ₂₅)容许偏差(%) Resistance tolerance at 25°C				B值(B _{25/50}) 容许偏差(%) B value tolerance	电阻值 R ₂₅ resistance	B值 B _{25/50} B value	B值 B _{25/85} B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/°C) Heat dissipation
MH18	3G202**	-40~+150°C	±1	±2	±3		±1	2kΩ	3,470K	3,507K	250	2
	3G302**		±1	±2	±3		±1	3kΩ	3,470K	3,507K		
	3G502**		±1	±2	±3		±1	5kΩ	3,470K	3,507K		
	3H103**		±1	±2	±3		±1	10kΩ	3,465K	3,502K		
	6E203**		±1	±2	±3		±1	20kΩ	3,965K	4,016K		
	6P303**		±1	±2	±3		±1	30kΩ	3,948K	3,984K		
	6H503**		±1	±2	±3		±1	50kΩ	3,770K	3,820K		
	3U104**		±1	±2	±3		±1	100kΩ	3,965K	4,038K		
	3U154**		±1	±2	±3		±1	150kΩ	3,965K	4,038K		

※ 关于 R-T 数据, 请参阅本公司主页。

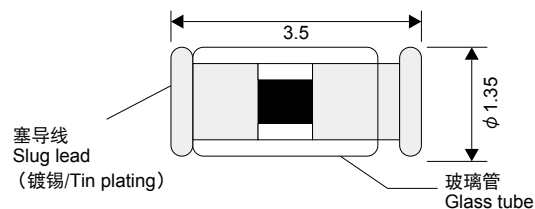
※Regarding R-T data, please refer to our web site.

For Power Devices

[High temp. range type]

MN18 / MH18 Series

形状・尺寸 Dimensions (mm)



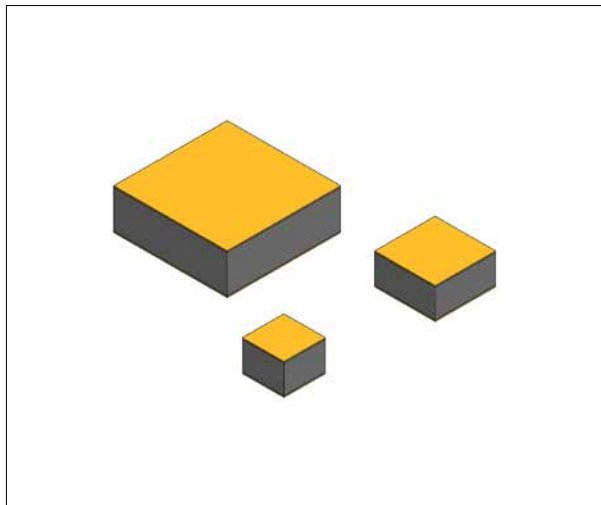
■Features

- Suitable for high temperature applications.
- Excellent choice for harsh environments.



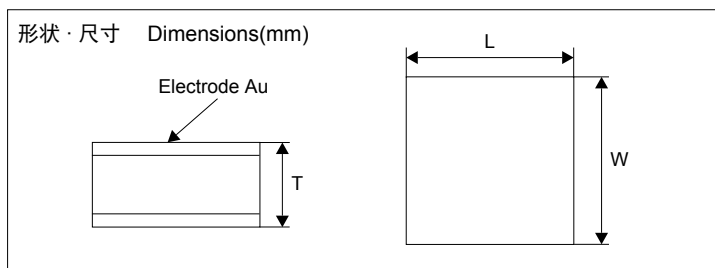
用于光通信 · LED 模块

VH 系列



For Optical Communications and LED Modules

VH series



系列名 Series	型名 Type	L	W	T
VH02	7J103HS	0.21±0.03	0.21±0.03	0.20 max.
VH05	6D103°C	0.32±0.05	0.32±0.05	0.20 max.
	6D123°C	0.32±0.05	0.32±0.05	0.23 max.
VH10	6E103°C	0.60±0.05	0.6±0.05	0.25 max.
	6Q103°C	0.52±0.05	0.52±0.05	0.30 max.
	3U104°C	0.50±0.05	0.50±0.05	0.30 max.

■推荐焊接条件

VH 系列 Au/Sn 焊接安装
焊接：Au/Sn（79/21）预制
安装设备：芯片焊接机
安装温度：320℃
环境：N₂

- 1) 超过 280℃ 的温度应控制在 10 秒以内。
- 2) 焊接后切勿迅速冷却，而应缓慢冷却。
- 3) 有关擦洗条件，请与本公司联系。

■Recommended Soldering Profile

VH Series Au/Sn Solder mounting
Solder：Au/Sn（79/21）Preform
Mounting device：Die bonder
Mounting Temperature：320℃
Atmosphere：N₂

- 1) Please keep exposure to temperature exceeding 280℃ to under 10seconds.
- 2) After soldering, do not force cool, allow the parts to cool gradually.
- 3) Please contact us about scrubbing procedures.



用于光通信模块

在严酷的环境下进行长期可靠性试验，实现了“ZERO SHIFT”，使电阻值几乎没有变化。



VH 系列

■特点

- 小型、高精度
- 可焊性与粘合性优异
- 金锡焊接贴装时的稳定性优异
- 长期可靠性和高耐热性优异

■VH02 系列 VH02 series

VH02系列(用于光通信模块) VH02Series (Unparalleled Long-Term Accuracy Thermistors for Optical Communications Modules)



系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R ₂₅)容许偏差(%) Resistance tolerance at 25℃			B值(B _{25/50}) 容许偏差(%) B value tolerance		电阻值 R ₂₅ resistance	B值 B _{25/50} B value	B值 B _{25/85} B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation
VH02	7J103HS	-40~+125℃			±3		±1	10kΩ	4,090K	4043K	14	0.14

■VH05 系列 VH05 series

VH05系列(用于光通信模块) VH05Series (Unparalleled Long-Term Accuracy Thermistors for Optical Communications Modules)



系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R _T)容许偏差(%) Resistance tolerance at 25℃			B值(B _{25/50}) 容许偏差(%) B value tolerance		电阻值 R _T resistance	B值 B _{25/50} B value	B值 B _{25/85} B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation
VH05	6D103*℃	-40~+125℃	±1	±2	±3		±1	R ₂₅ =10kΩ	3,930K	3,941K	15	0.15
VH05	6D123*℃		±1	±2	±3		±1	R ₃₀ =10kΩ	3,930K	3,941K		

■VH10 系列 VH10 series

VH10系列(用于光通信模块) VH10Series (Unparalleled Long-Term Accuracy Thermistors for Optical Communications Modules)



系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R ₂₅)容许偏差(%) Resistance tolerance at 25℃			B值(B _{25/50}) 容许偏差(%) B value tolerance		电阻值 R ₂₅ resistance	B值 B _{25/50} B value	B值 B _{25/85} B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation
VH10	6E103*℃	-40~+125℃	±1	±2	±3		±1	10kΩ	3,950K	4,000K	30	0.3
	6Q103*℃		±1	±2	±3		±1	10kΩ	3,410K	3,455K		
	3U104*℃		±1	±2	±3		±1	100kΩ	3,950K	4,024K		

板载式热敏电阻

ON BOARD THERMISTOR



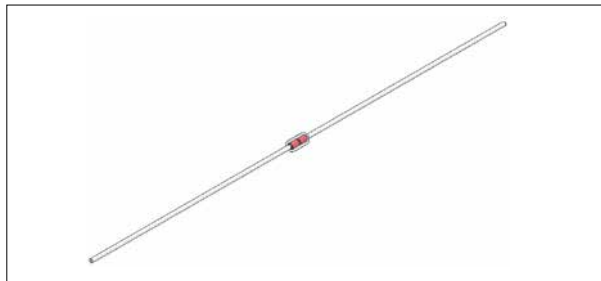
汽车

用于进气温度

用于ECU

[轴向导线型]

GA13/GH13



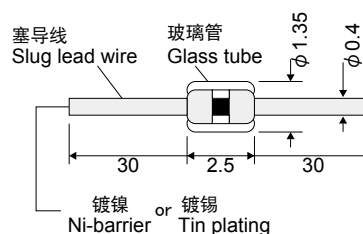
Automotive products

For Air Temperature / For ECU

[Axial leaded type]

GA13 / GH13

形状・尺寸 Dimensions (mm)



■ 特点

- 可在高温下使用
- 适合自动插装

■ Features

- Suitable for high temperature applications.
- Can be used with automatic insertion equipment.

■ 特性 Characteristics

GA13/GH13 系列 (300℃耐热产品) GA13/GH13Series (300℃ Heat resistance products)



系列名 Series	型号 (type)	使用温度范围 Temperature range	电阻值 (R25) 容许偏差 (%) Resistance tolerance at 25℃				B值 (B25/50) 容 许偏差 (%) B value tolerance		电阻值 R25 resistance	B值 B25/50 B value	B值 B25/85 B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation	热响应时间常数 (S) Thermal time constant
GA13	3G202 **	-40~+300℃	-	-	±3	±5	-	±3	2kΩ	3,470K	3,507K	357	1.3	14
	3G302 **		-	-	±3	±5	-	±3	3kΩ	3,470K	3,507K			
	6D502 **		-	-	±3	±5	-	±3	5kΩ	3,950K	3,961K			
	6P303 **		-	-	±3	±5	-	±3	30kΩ	3,948K	3,984K			
	3U104 **		-	-	±3	±5	-	±3	100kΩ	3,965K	4,038K			
GH13	3G202 **		±1	±2	±3	-	±1	-	2kΩ	3,470K	3,507K			
	3G302 **		±1	±2	±3	-	±1	-	3kΩ	3,470K	3,507K			
	6D502 **		±1	±2	±3	-	±1	-	5kΩ	3,950K	3,961K			
	6P303 **		±1	±2	±3	-	±1	-	30kΩ	3,948K	3,984K			
	3U104 **		±1	±2	±3	-	±1	-	100kΩ	3,965K	4,038K			

GA13/GH13 系列 (150℃耐热产品) GA13/GH13Series (150℃ Heat resistance products)



系列名 Series	型号 (type)	使用温度范围 Temperature range	电阻值 (R25)容许偏差 (%) Resistance tolerance at 25℃				B值 (B25/50)容 许偏差 (%) B value tolerance		电阻值 R25 resistance	B值 B25/50 B value	B值 B25/85 B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation	热响应时间常数 (S) Thermal time constant
GA13	3H103 **	-40~+150℃	—	—	±3	±5	—	±3	10kΩ	3,465K	3,502K	162	1.3	14
	6E203 **		—	—	±3	±5	—	±3	20kΩ	3,965K	4,016K			
	6H503 **		—	—	±3	±5	—	±3	50kΩ	3,770K	3,820K			
GH13	3H103 **		±1	±2	±3	—	±1	—	10kΩ	3,465K	3,502K			
	6E203 **		±1	±2	±3	—	±1	—	20kΩ	3,965K	4,016K			
	6H503 **		±1	±2	±3	—	±1	—	50kΩ	3,770K	3,820K			

※ 关于镀镍产品与镀锡产品的型号表示法

希望订购镀锡产品时, 请将“- (连字符)”改为“Z”即可。

(例如) 镀镍产品: GA13-3H103**

镀锡产品: GA13Z3H103**

对于镀锡产品, 无论上述耐热产品如何分类, 容许温度全都为 150℃。

※ 关于 R-T 数据, 请参阅本公司网站。

※ For nickel or Tin plating

Place a "Z" in place of the "-" (hyphen) when ordering Tin plated parts.

(example) Nickel plated part : GA13-3H103 **

Tin plated part : GA13Z3H103 **

Please note Tin plated parts have a maximum heat resistances of 150℃.

※ Regarding R-T data, please refer to our web site.

板载式热敏电阻

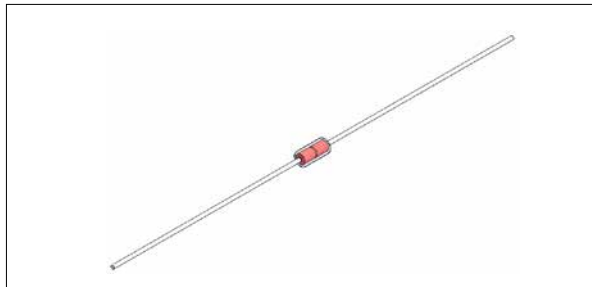
ON BOARD THERMISTOR

汽车

用于进气温度 用于ECU

[轴向导线型]

GA20/GH20



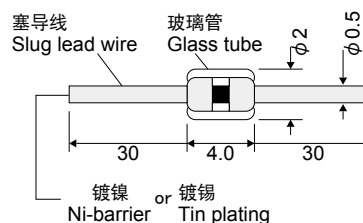
Automotive products

For Air Temperature / For ECU

[Axial lead type]

GA20 / GH20

形状・尺寸 Dimensions(mm)



■特点

- 可在高温下使用
- 适合自动插装

■Features

- Suitable for high temperature applications.
- Can be used with automatic insertion equipment.

■特性 Characteristics

GA20/GH20系列 (300℃耐热产品) GA20/GH20Series (300℃Heat resistance products)

系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R ₂₅)容许偏差(%) Resistance tolerance at 25℃				B值(B _{25/50}) 容许偏差(%) B value tolerance		电阻值 R ₂₅ resistance	B值 B _{25/50} B value	B值 B _{25/85} B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation	热响应时间常数 (S) Thermal time constant
GA20	3G202**	-40~+300℃	—	—	±3	±5	—	±3	2kΩ	3,470K	3,507K	495	1.8	25
	3G302**		—	—	±3	±5	—	±3	3kΩ	3,470K	3,507K			
	6D502**		—	—	±3	±5	—	±3	5kΩ	3,950K	3,961K			
	6P203**		—	—	±3	±5	—	±3	20kΩ	3,948K	3,984K			
	6P303**		—	—	±3	±5	—	±3	30kΩ	3,948K	3,984K			
	3U503**		—	—	±3	±5	—	±3	50kΩ	3,965K	4,038K			
	3U104**		—	—	±3	±5	—	±3	100kΩ	3,965K	4,038K			
GH20	3G202**		±1	±2	±3	—	±1	—	2kΩ	3,470K	3,507K			
	3G302**		±1	±2	±3	—	±1	—	3kΩ	3,470K	3,507K			
	6D502**		±1	±2	±3	—	±1	—	5kΩ	3,950K	3,961K			
	6P203**		±1	±2	±3	—	±1	—	20kΩ	3,948K	3,984K			
	6P303**		±1	±2	±3	—	±1	—	30kΩ	3,948K	3,984K			
	3U503**		±1	±2	±3	—	±1	—	50kΩ	3,965K	4,038K			
	3U104**		±1	±2	±3	—	±1	—	100kΩ	3,965K	4,038K			

GA20/GH20系列 (150℃耐热产品) GA20/GH20Series (150℃Heat resistance products)

系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R ₂₅)容许偏差(%) Resistance tolerance at 25℃				B值(B _{25/50}) 容许偏差(%) B value tolerance		电阻值 R ₂₅ resistance	B值 B _{25/50} B value	B值 B _{25/85} B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation	热响应时间常数 (S) Thermal time constant
GA20	3H103**	-40~+150℃	—	—	±3	±5	—	±3	10kΩ	3,465K	3,502K	225	1.8	25
GH20	3H103**		±1	±2	±3	—	±1	—	10kΩ	3,465K	3,502K			

※关于镀镍产品与镀锡产品的型号表示法

希望订购镀锡产品时, 请将“—(连字符)”改为“Z”即可。

(例如) 镀镍产品: GA20-3H103**

镀锡产品: GA20Z3H103**

对于镀锡产品, 无论上述耐热产品如何分类, 容许温度全都为150℃。

※关于R-T数据, 请参阅本公司网站。

※ For nickel or Tin plating

Place a "Z" in place of the "-" (hyphen) when ordering Tin plated parts.

(example) Nickel plated part : GA20-3H103 **

Tin plated part : GA20Z3H103 **

Please note Tin plated parts have a maximum heat resistances of 150℃.

※ Regarding R-T data, please refer to our web site.

板载式热敏电阻

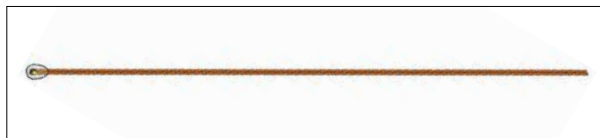
ON BOARD THERMISTOR

汽车

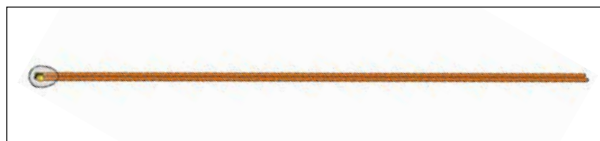
用于水温、油温、进气温度、ECU、EGR、
汽车空调(蒸发器、外界气温)、发动机

[径向导线型]

GR15



GR25



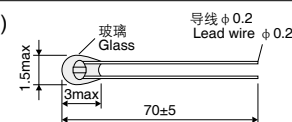
Automotive products

For Water Temp / Oil Temp, Air Temp, ECU, EGR
car air conditioner (Evaporator, Ambient), motor

[Radial Leaded Type]

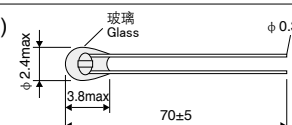
GR15

形状・尺寸 Dimensions(mm)



GR25

形状・尺寸 Dimensions(mm)



■特性 Characteristics

GR15 系列 300℃耐热产品 GR15Series 300℃ Heat resistance products

系列名 Series	型号 (Type)	使用温度范围 Temperature range	电阻值(R25)容许偏差(%) Resistance tolerance at 25℃				B值(B25/50) 容许偏差(%) B value tolerance		电阻值 R25 resistance	电阻值 R100 resistance	电阻值 R200 resistance	B值 B25/50 B value	B值 B25/85 B value	B值 B0/100 B value	B值 B100/200 B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation	热响应时间常数 (S) Thermal time constant
GR15	7A103**	-40~+300℃	±1	±2	±3	±5	±1	±3	10kΩ	0.531kΩ	0.0496kΩ	4,397K	4,369K	4,375K	4,184K	192	0.7	6
	6P493**		±1	±2	±3	±5	±1	±3	49.12kΩ	3.315kΩ	0.3097kΩ	3,946K	3,984K	3,961K	4,185K			
	7C993**		±1	±2	±3	±5	±1	±3	98.63kΩ	6.264kΩ	0.5660kΩ	4,036K	4,074K	4,052K	4,245K			
	7B104**		±1	±2	±3	±5	±1	±3	100kΩ	3.813kΩ	0.2490kΩ	4,828K	4,843K	4,818K	4,818K			
	7D234**		±1	±2	±3	±5	±1	±3	231.4kΩ	12.980kΩ	1.0170kΩ	4,207K	4,254K	4,221K	4,496K			
	5D105**		±1	±2	±3	±5	±1	±3	1MΩ	29.930kΩ	1.4440kΩ	5,121K	5,184K	5,134K	5,352K			
	7E145**		±1	±2	±3	±5	±1	±3	1.388MΩ	63.870kΩ	4.0210kΩ	4,460K	4,537K	4,488K	4,882K			
	5E106**		±1	±2	±3	±5	±1	±3	10MΩ	242.100kΩ	8.8710kΩ	5,393K	5,486K	5,425K	5,838K			

GR15 系列 150℃耐热产品 GR15Series 150℃ Heat resistance products

系列名 Series	型号 (Type)	使用温度范围 Temperature range	电阻值(R25)容许偏差(%) Resistance tolerance at 25℃				B值(B25/50) 容许偏差(%) B value tolerance		电阻值 R25 resistance	电阻值 R100 resistance	—	B值 B25/50 B value	B值 B25/85 B value	B值 B0/100 B value	—	最大功率 (mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation	热响应时间常数 (S) Thermal time constant
GR15	6S222**	-40~+150℃	±1	±2	±3	±5	±1	±3	2.186kΩ	0.2166kΩ	—	3,386K	3,419K	3,390K	—	87	0.7	6
	3G302**		±1	±2	±3	±5	±1	±3	3kΩ	0.2757kΩ	—	3,490K	3,527K	3,499K	—			
	6Q542**		±1	±2	±3	±5	±1	±3	5.369kΩ	0.5103kΩ	—	3,243K	3,468K	3,450K	—			
	6Q852**		±1	±2	±3	±5	±1	±3	8.471kΩ	0.8051kΩ	—	3,243K	3,468K	3,450K	—			
	6Q113**		±1	±2	±3	±5	±1	±3	10.74kΩ	1.0210kΩ	—	3,243K	3,468K	3,450K	—			
	6M373**		±1	±2	±3	±5	±1	±3	36.74kΩ	2.2620kΩ	—	3,985K	4,099K	4,015K	—			
	6N493**		±1	±2	±3	±5	±1	±3	48.70kΩ	3.1250kΩ	—	3,935K	4,030K	3,988K	—			

GR25 系列 150℃耐热产品 GR25Series 150℃ Heat resistance products

系列名 Series	型号 (Type)	使用温度范围 Temperature range	电阻值(R25)容许偏差(%) Resistance tolerance at 25℃				B值(B25/50) 容许偏差(%) B value tolerance		电阻值 R25 resistance	电阻值 R100 resistance	—	B值 B25/50 B value	B值 B25/85 B value	B值 B0/100 B value	—	最大功率 (mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation	热响应时间常数 (S) Thermal time constant
GR25	3 G202**	-40~+150℃		±2	±3	±5	±1	±3	2kΩ	0.1838kΩ	—	3,490K	3,527K	3,499K	—	125	1	16
	6 S222**			±2	±3	±5	±1	±3	2.175kΩ	0.2156kΩ	—	3,386K	3,419K	3,390K	—			

※ 关于 R-T 数据, 请参阅本公司网站。

※ Regarding R-T data, please refer to our web site.

板载式热敏电阻

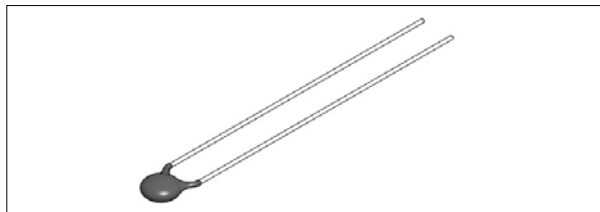
ON BOARD THERMISTOR

汽车

用于汽车空调（车内温度）、ECU

[径向导线型]

CN/CH25



■ 特点

- 小型、高精度
- 温度循环特性优异

■ 特性 Characteristics

CN25 系列 CN25Series

系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R25)容许偏差(%) Resistance tolerance at 25℃				B值(B25/50) 容许偏差(%) B value tolerance		电阻值 R25 resistance	B值 B25/50 B value	B值 B25/85 B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation	热响应时间常数 (S) Thermal time constant
CN25	3G501**	-40~+110℃			±3	±5	—	±3	500Ω	3,450K	3,488K	59.5	0.7	14
	3G102**				±3	±5	—	±3	1kΩ	3,450K	3,488K			12
	6D102**				±3	±5	—	±3	1kΩ	3,930K	3,941K			14
	3G202**				±3	±5	—	±3	2kΩ	3,450K	3,488K			14
	6D202**				±3	±5	—	±3	2kΩ	3,930K	3,941K			12
	3G302**				±3	±5	—	±3	3kΩ	3,450K	3,488K			12
	6D302**				±3	±5	—	±3	3kΩ	3,930K	3,941K			14
	3H502**				±3	±5	—	±3	5kΩ	3,450K	3,486K			14
	6E502**				±3	±5	—	±3	5kΩ	3,950K	4,001K			12
	3H103**				±3	±5	—	±3	10kΩ	3,450K	3,466K			12
	3T103**				±3	±5	—	±3	10kΩ	3,950K	3,989K			14
	3T203**				±3	±5	—	±3	20kΩ	3,950K	3,989K			12
	3U303**				±3	±5	—	±3	30kΩ	3,950K	4,025K			14
	3U503**				±3	±5	—	±3	50kΩ	3,950K	4,025K			14
	3U104**				±3	±5	—	±3	100kΩ	3,950K	4,025K			12
	4L204**				±3	±5	—	±3	200kΩ	4,550K	4,629K			14
	4L304**				±3	±5	—	±3	300kΩ	4,550K	4,629K			14
	4L504**				±3	±5	—	±3	500kΩ	4,550K	4,629K			12

CH25 系列 CH25Series

系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R25)容许偏差(%) Resistance tolerance at 25℃				B值(B25/50) 容许偏差(%) B value tolerance		电阻值 R25 resistance	B值 B25/50 B value	B值 B25/85 B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation	热响应时间常数 (S) Thermal time constant
CH25	3G501**	-40~+110℃	±1	±2	±3	—	±1	—	500Ω	3,450K	3,488K	59.5	0.7	14
	3G102**		±1	±2	±3	—	±1	—	1kΩ	3,450K	3,488K			12
	6D102**		±1	±2	±3	—	±1	—	1kΩ	3,930K	3,941K			14
	3G202**		±1	±2	±3	—	±1	—	2kΩ	3,450K	3,488K			14
	6D202**		±1	±2	±3	—	±1	—	2kΩ	3,930K	3,941K			12
	3G302**		±1	±2	±3	—	±1	—	3kΩ	3,450K	3,488K			12
	6D302**		±1	±2	±3	—	±1	—	3kΩ	3,930K	3,941K			14
	3H502**		±1	±2	±3	—	±1	—	5kΩ	3,450K	3,486K			14
	6E502**		±1	±2	±3	—	±1	—	5kΩ	3,950K	4,001K			12
	3H103**		±1	±2	±3	—	±1	—	10kΩ	3,450K	3,466K			12
	3T103**		±1	±2	±3	—	±1	—	10kΩ	3,950K	3,989K			14
	3T203**		±1	±2	±3	—	±1	—	20kΩ	3,950K	3,989K			12
	3U303**		±1	±2	±3	—	±1	—	30kΩ	3,950K	4,025K			14
	3U503**		±1	±2	±3	—	±1	—	50kΩ	3,950K	4,025K			14
	3U104**		±1	±2	±3	—	±1	—	100kΩ	3,950K	4,025K			12
	4L204**		—	±2	±3	—	±1	—	200kΩ	4,550K	4,629K			14
	4L304**		—	±2	±3	—	±1	—	300kΩ	4,550K	4,629K			14
	4L504**		—	±2	±3	—	±1	—	500kΩ	4,550K	4,629K			12

※ 有关 CH25 系列是低卤素规格
(氯、溴分别在 900ppm 以内, 卤素 total1500ppm 以内)
的产品, 请与本公司协商。

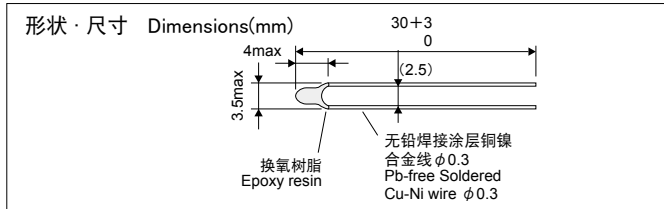
※ 关于 R-T 数据, 请参阅本公司网站。

Automotive products

For car air conditioner (Room Temp), ECU

[Radial Leaded Type]

CN25/CH25



■ Features

- Small precision type.
- Excellent thermal cycle endurance.

RoHS REACH

RoHS REACH

板载式热敏电阻

ON BOARD THERMISTOR

汽车

用于 ECU

[径向导线型]

BN35



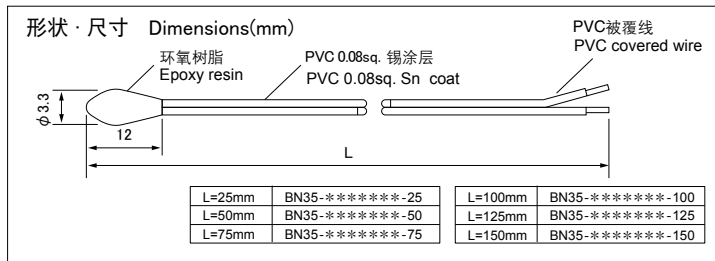
※BN35系列中也有（氯、溴分别在900ppm以内，卤素total1500ppm以内）的产品，请与本公司协商。

Automotive products

For ECU

[Radial Leaded Type]

BN35



※ For BN35 series, they are low - halogen products
(Specification: Cl, Br each 900ppm or less., halogen total 1,500ppm or less.).
Please approach us for details.

■特性 Characteristics

BN35 系列 BN35Series

系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R25)容许偏差(%) Resistance tolerance at 25℃			B值(B25/50) 容许偏差(%) B value tolerance	电阻值 R25 resistance	B值 B25/50 B value	B值 B25/85 B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation	热响应时间常数 (S) Thermal time constant
BN35	3H103**	-20~+80℃	±1	±2	±3	±1	10kΩ	3,450K	3,486K	132	2.4	40
	3T103**		±1	±2	±3	±1	10kΩ	3,950K	3,989K			
	3U104**		±1	±2	±3	±1	100kΩ	3,950K	4,024K			
	5B225**		—	—	±3	±3	2.2MΩ	5,200K	5,290K			

※ BN35 系列中也有通过 UL1434 标准的产品。

※ 关于 R-T 数据，请参阅本公司网站。

※ 安全标准认定条件可能会被修订。关于最新的认定状况，请确认各标准的主页。

※ Regarding R-T data, please refer to our web site.

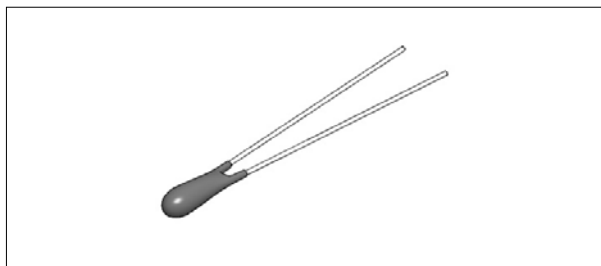
※ It is available in a UL1434 approved type for BN35 series.

※ Safety standard certification conditions may be revised. Would you confirm the web site of each standard about the latest information.

电池、ECU、汽车空调（车内温度）

[径向导线型]

RH18

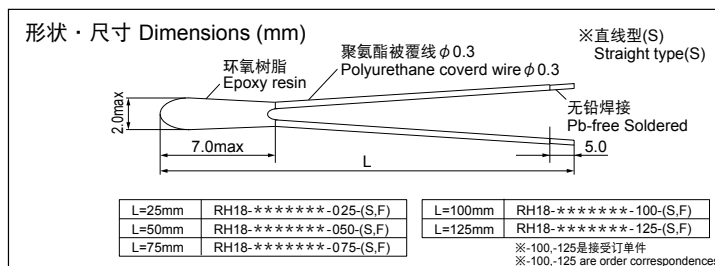


※RH18 系列还有低卤素规格。

For Battery cells, ECU, car air conditioner(room Temp)

[Radial Leaded Type]

RH18



※ For RH18 series, they are low - halogen products.

■特性 Characteristics

RH18 系列 RH18Series

系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R25)容许偏差(%) Resistance tolerance at 25℃			B值(B25/85) 容许偏差(%) B value tolerance	电阻值 R25 resistance	B值 B25/85 B value	B值 B25/50 B value	最大功率 (mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation	热响应时间常数 (S) Thermal time constant
RH18	6Y103**	-40~+110℃	±1	±2	±3	±1	10kΩ	3,390K	3,435K	85	1.0	12
	3H103**		±1	±2	±3	±1	10kΩ	3,450K	3,486K			
	3U104**		±1	±2	±3	±1	100kΩ	3,950K	4,025K			

※ 关于 R-T 数据，请参阅本公司网站。

※ RH18 系列中也有通过 UL1434 标准的产品。(File No. E318570)

※ 安全标准认定条件可能会被修订。关于最新的认定状况，请确认各标准的主页。

※ Regarding R-T data, please refer to our web site.

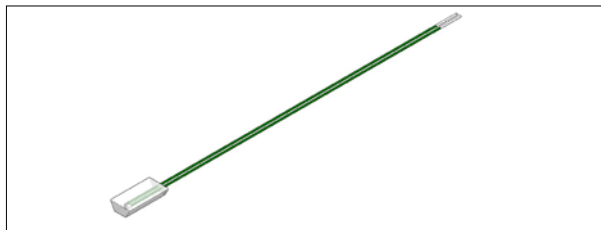
※ It is available in a UL1434 approved type for RH18 series. (File No. E318570)

※ Safety standard certification conditions may be revised. Would you confirm the web site of each standard about the latest information.

板载式热敏电阻

ON BOARD THERMISTOR

用于电池

[径向导线型]
BM38

※BM38 系列是低卤素规格产品。

■特性 Characteristics

BM38

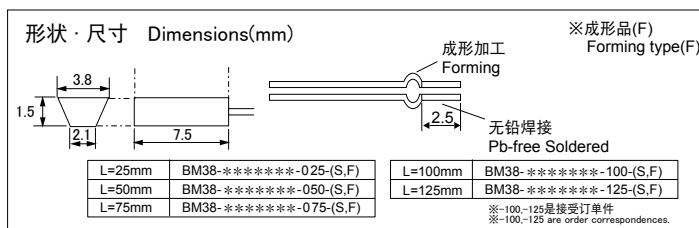
系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R ₂₅)容许偏差(%) Resistance tolerance at 25℃			B值(B _{25/50}) 容许偏差(%) B value tolerance	电阻值 R ₂₅ resistance	B值 B _{25/50} B value	B值 B _{25/85} B value	最大功率(mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation	热响应时间常数(S) Thermal time constant
BM38	3H103**	-40~+100℃	±1	±2	±3	±1	10kΩ	3,450K	3,486K	97.5	1.3	25

※ 关于 R-T 数据, 请参阅本公司网站。

※BM38 系列中也有通过 UL1434 标准的产品。(File No. E318570)

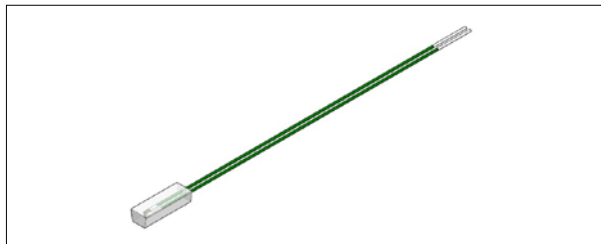
※ 安全标准认定条件可能会被修订。关于最新的认定状况, 请确认各标准的主页。

For Battery cells

[Radial Leaded Type]
BM38

※ For BM38, low - halogen is also applied.

BM22



※BM22 系列是低卤素规格产品。

■特性 Characteristics

BM22

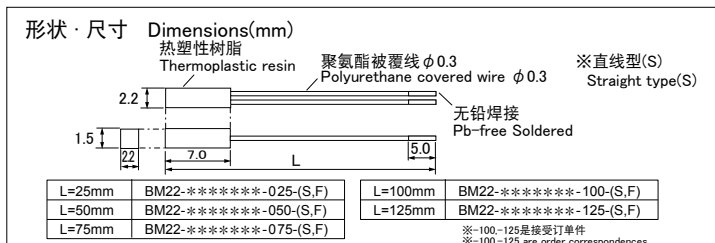
系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R ₂₅)容许偏差(%) Resistance tolerance at 25℃			B值(B _{25/50}) 容许偏差(%) B value tolerance	电阻值 R ₂₅ resistance	B值 B _{25/50} B value	B值 B _{25/85} B value	最大功率(mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation	热响应时间常数(S) Thermal time constant
BM22	3H103**	-40~+100℃	±1	±2	±3	±1	10kΩ	3,450K	3,486K	90	1.2	22

※ 关于 R-T 数据, 请参阅本公司网站。

※BM22 系列中也有通过 UL1434 标准的产品。(File No. E318570)

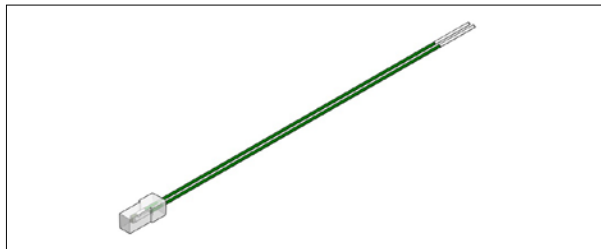
※ 安全标准认定条件可能会被修订。关于最新的认定状况, 请确认各标准的主页。

BM22



※ For BM22, low - halogen is also applied.

BM18



※BM18 系列是低卤素规格产品。

■特性 Characteristics

BM18

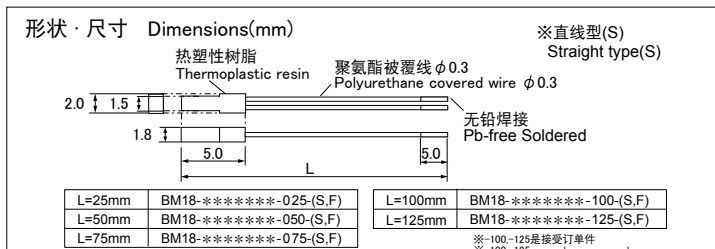
系列名 Series	型号(Type)	使用温度范围 Temperature range	电阻值(R ₂₅)容许偏差(%) Resistance tolerance at 25℃			B值(B _{25/50}) 容许偏差(%) B value tolerance	电阻值 R ₂₅ resistance	B值 B _{25/50} B value	B值 B _{25/85} B value	最大功率(mW) Maximum power dissipation	散热系数 (mW/℃) Heat dissipation	热响应时间常数(S) Thermal time constant
BM18	3H103**	-40~+100℃	±1	±2	±3	±1	10kΩ	3,450K	3,486K	97.5	1.3	23

※ 关于 R-T 数据, 请参阅本公司网站。

※ BM18 系列中也有通过 UL1434 标准的产品。(File No. E318570)

※ 安全标准认定条件可能会被修订。关于最新的认定状况, 请确认各标准的主页。

BM18



※ For BM18, low - halogen is also applied.

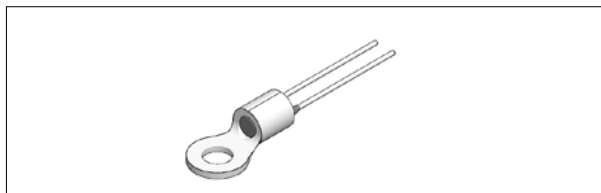
热敏传感器

THERMISTOR SENSORS

用于表面温度检测

For Measuring surface Temp

STS-40

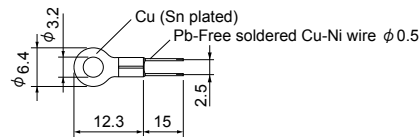


- 电阻值..... $R_{25}=10k\Omega \pm 1\%$
- B 值 (3H) $B_{25/50}=3450K \pm 1\%$
 $B_{25/85}=3486K$
- 使用温度范围..... $-30^{\circ}C \sim +110^{\circ}C$
- 热响应时间常数(铝块上).....18sec.

STS-40

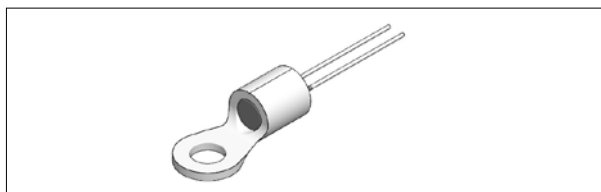


形状・尺寸 Dimensions(mm)



- Resistance..... $R_{25}=10k\Omega \pm 1\%$
- B value (3H) $B_{25/50}=3450K \pm 1\%$
 $B_{25/85}=3486K$
- Operating temperature range..... $-30^{\circ}C \sim +110^{\circ}C$
- Thermal time constant (on Al block)..... 18sec.

STS-50

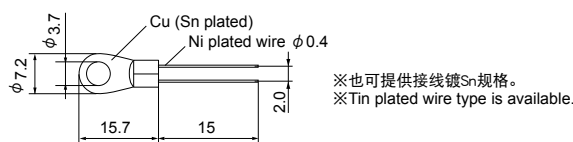


- 电阻值..... $R_{25}=10k\Omega \pm 3\%$
- B 值 (3HG)..... $B_{25/50}=3465K \pm 3\%$
 $B_{25/85}=3502K$
- 使用温度范围..... $-40^{\circ}C \sim +150^{\circ}C$
- 热响应时间常数(铝块上).....22sec.

STS-50



形状・尺寸 Dimensions(mm)



- Resistance..... $R_{25}=10k\Omega \pm 3\%$
- B value (3HG)..... $B_{25/50}=3465K \pm 3\%$
 $B_{25/85}=3502K$
- Operating temperature range..... $-40^{\circ}C \sim +150^{\circ}C$
- Thermal time constant (on Al block)..... 22sec.

■特点

- 安装时可采用螺栓固定
- 采用金属吸热面，温度响应快

※STS 系列的热时间常数是按照以下方法测定，所以测定值受氧化铝的热容量的影响。

※ 首先用螺钉凝固氧化铝 (120L×120W×20Tmm)，然后将除温度传感器的部分浸入 25 度的水中。之后再将氧化铝移之 50 度的水中。

※ 关于 R-T 数据，请参阅本公司网站。

※ 有关热敏温度传感器的使用环境条件，请与本公司协商。

■Features

- Can be fastened with a screw.
- Metal contact surface yields fast temperature response.

※Thermal time constant of STS series is measured by following method. The data contains the influence of the heat capacity of the aluminum block.

※The sensor is screwed up on aluminum block (120L×120W×20Tmm), the block except sensor attached surface is put into 25°C water. From this state when block is moved into 50°C water.

※Regarding R-T data, please refer to our web site.

※Please consult us regarding the operating conditions of Thermistor sensors.

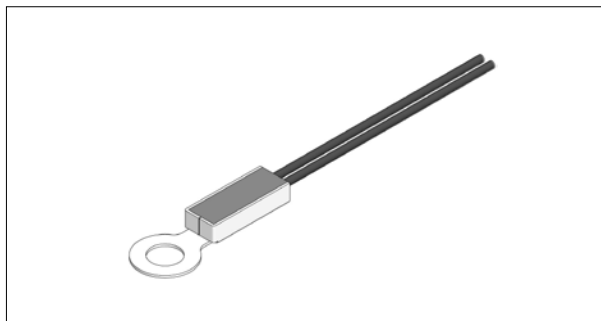
热敏传感器

THERMISTOR SENSORS

汽车

高速应答表面温度传感器

STS-73



- 电阻值..... $R_{25}=10k\Omega\pm3\%$
- B 值..... $B_{25/50}=3380K\pm2\%$
- 使用温度范围..... $-40^{\circ}\text{C}\sim+120^{\circ}\text{C}$
- 热响应时间常数(热板接触式).....5sec

■特点

- 螺钉紧固型，容易安装
- 内置本公司的贴片式热敏电阻，实现高可靠性
- 通过本公司独特的加工方法实现高速响应

关于 RT 数据，请参阅本公司网站。

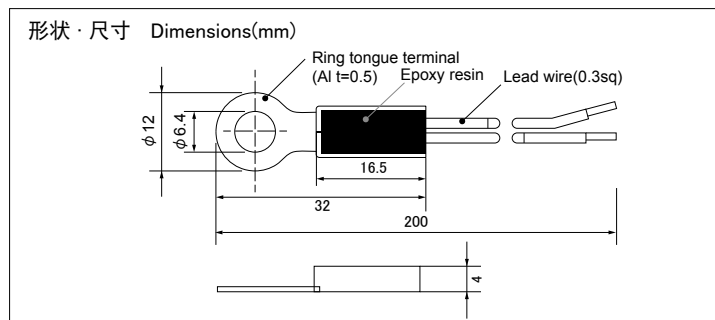
※有关热敏温度传感器的使用环境条件，请与本公司协商。

Automotive products

Quick Response Surface Sensor



STS-73



- Resistance..... $R_{25}=10k\Omega\pm3\%$
- B value..... $B_{25/50}=3380K\pm2\%$
- Operating temperature range..... $-40^{\circ}\text{C}\sim+120^{\circ}\text{C}$
- Thermal time constant (direct connection).....5sec

■Features

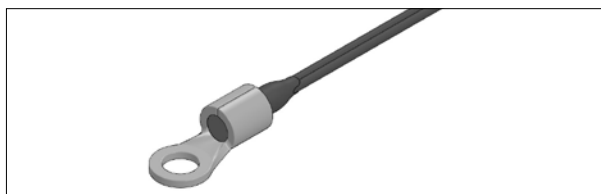
- Ring-tongue is very easy to mount.
- Extremely reliable due to our chip type thermistor being used.
- Quick response due to unique construction.

※Regarding R-T data, please refer to our web site.

※Please consult us regarding the operating conditions of Thermistor sensors.

用于变频器、DCDC 变流器、充电器

STS-51



- 电阻值..... $R_{25}=10k\Omega\pm5\%$
- B 值 (3TV)..... $B_{25/50}=3820K\pm3\%$
 $B_{25/85}=3792K$
- 使用温度范围..... $-40^{\circ}\text{C}\sim+150^{\circ}\text{C}$
- 热响应时间常数(铝块上).....27sec.

■特点

- 安装时可采用螺栓固定
- 采用金属吸热面，温度响应快

※STS系列的热时间常数是按照以下方法测定，所以测定值受氧化铝的热容量的影响。

※首先用螺钉凝固氧化铝(120L×120W×20Tmm)，然后将除温度传感器的部分浸入25度的水中。之后再氧化铝移之50度的水中。

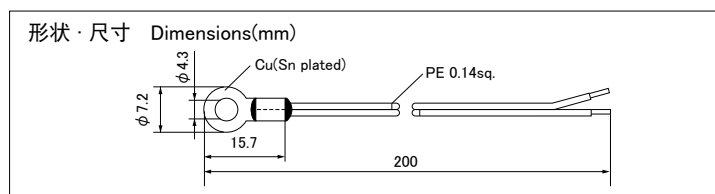
※关于R-T数据，请参阅本公司网站。

※关热敏温度传感器的使用环境条件，请与本公司协商。

For Inverter,DCDC converter,Charger



STS-51



- Resistance..... $R_{25}=10k\Omega\pm5\%$
- B value (3TV)..... $B_{25/50}=3820K\pm3\%$
 $B_{25/85}=3792K$
- Operating temperature range..... $-40^{\circ}\text{C}\sim+150^{\circ}\text{C}$
- Thermal time constant (on Al block).....27sec.

■Features

- Can be fastened with a screw.
- Metal contact surface yields fast temperature response.

※Thermal time constant of STS series is measured by following method. The data contains the influence of the heat capacity of the aluminum block.

※The sensor is screwed up on aluminum block (120L×120W×20Tmm), the block except sensor attached surface is put into 25°C water. From this state when block is moved into 50°C water.

※Regarding R-T data, please refer to our web site.

※Please consult us regarding the operating conditions of Thermistor sensors.

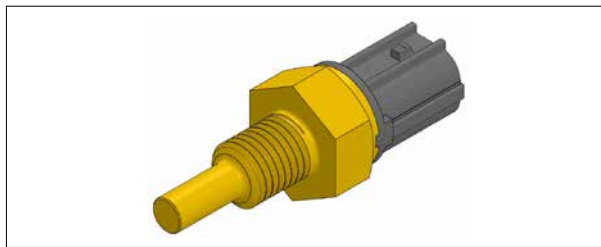
热敏传感器

THERMISTOR SENSORS

汽车

油温传感器

TOL-56



- 使用温度范围 $-30^{\circ}\text{C}\sim+200^{\circ}\text{C}$ (传感器部位)
- 电阻值 $R_{100}=0.2156\text{k}\Omega$
- B值 $B_{50/100}=3456\text{K}$
- 热响应时间常数 $\tau=6\text{sec}$ (搅拌水中)

特性、连接器形状变更等可应对客户要求。

■特点

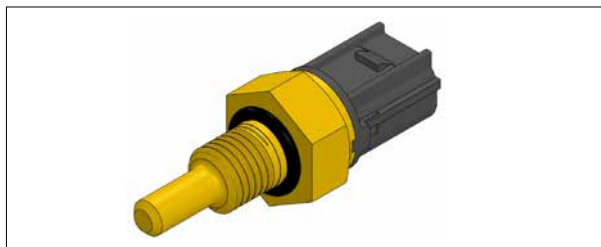
- 防水连接器一体化传感器
- 温度检测精度高
- 响应快 (6sec)
- 耐热性高 (传感器部位 200°C)
- 耐严苛的温度循环冲击和振动
- 双重成型技术实现优异的气密性

■用途

- 使用于控制摩托车、汽车的F1 (电子燃料喷射) 系统
- 检测发动机油的温度
- 使用于检测其他产业、住宅设施的水和油的温度

水温传感器

TWT-56



- 使用温度范围 $-30^{\circ}\text{C}\sim+120^{\circ}\text{C}$ (传感器部位)
- 电阻值 $R_{100}=0.156\text{k}\Omega$
- B值 $B_{50/100}=3824\text{K}$
- 热响应时间常数 $\tau=6\text{sec}$ (搅拌水中)

特性、连接器形状变更等可应对客户要求。

■特点

- 防水连接器一体化传感器
- 温度检测精度高
- 响应快 (6sec)
- 耐严苛的温度循环冲击和振动
- 双重成型技术实现优异的气密性

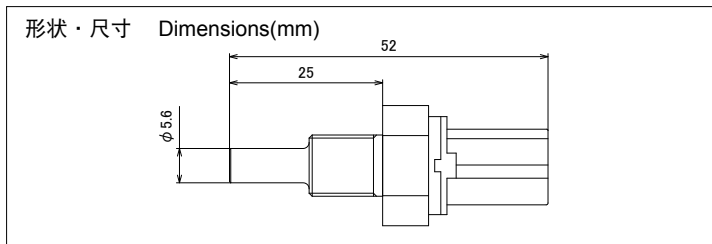
■用途

- 使用于控制摩托车、汽车的F1 (电子燃料喷射) 系统
- 检测发动机冷却水的温度
- 使用于检测其他产业、住宅设施的水和油的温度

Automotive products

Oil Temperature Sensor

TOL-56



- Operating temperature $-30^{\circ}\text{C}\sim+200^{\circ}\text{C}$ (sensor portion)
- Resistance $R_{100}=0.2156\text{k}\Omega$
- B-Value $B_{50/100}=3456\text{K}$
- Thermal constant $\tau=6\text{sec}$ (in stirred water)

Shape, characteristics, among others is customizable.

■Features

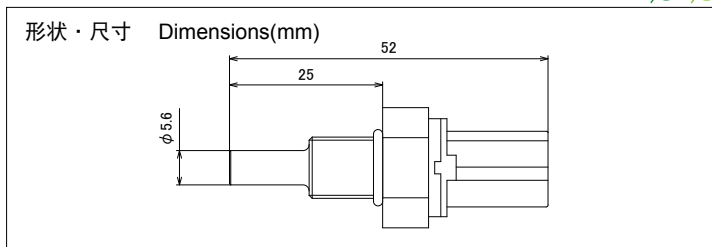
- Integrated waterproof connector sensor
- Precise temperature measuring
- Quick response (6 sec)
- Durable at high temperature (sensor portion 200°C)
- Tough against extreme heat cycling and vibration
- Double molding makes for airtight construction

■Applications

- Electronic fuel injection for motorcycles or automobiles
- Measuring oil temperature
- Measuring liquid temperature for industrial or household applications

Coolant Temperature Sensor

TWT-56



- Operating temperature $-30^{\circ}\text{C}\sim+120^{\circ}\text{C}$ (sensor portion)
- Resistance $R_{100}=0.156\text{k}\Omega$
- B-Value $B_{50/100}=3824\text{K}$
- Thermal constant $\tau=6\text{sec}$ (in stirred water)

Shape, characteristics, among others is customizable.

■Features

- Integrated waterproof connector sensor
- Precise temperature measuring
- Quick response (6 sec)
- Tough against extreme heat cycling and vibration
- Double molding makes for airtight construction

■Applications

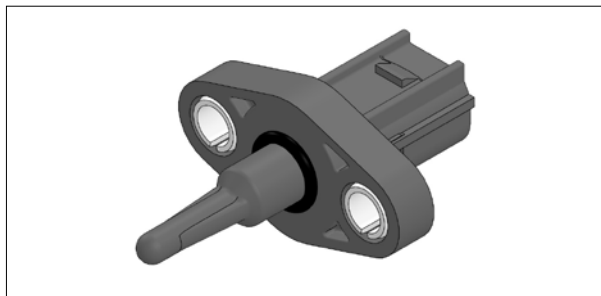
- Electronic fuel injection for motorcycles or automobiles
- Measuring coolant temperature
- Measuring liquid temperature for industrial or household applications



汽车

进气温度传感器

IAT-40



- 使用温度范围 $-30^{\circ}\text{C} \sim +120^{\circ}\text{C}$
- 电阻值 $R_{100}=0.1553\text{k}\Omega$
- B值 $B_{50/100}=3824\text{K}$
- 热响应时间常数 $\tau=6\text{sec}$ (搅拌水中)

特性、连接器形状变更等可应对客户要求。

■ 特长

- 防水连接器一体化传感器
- 使用螺丝固定，安装牢固可靠
- 温度检测精度高
- 响应快 (6sec)
- 耐严苛的温度循环冲击和振动
- 双重成型技术实现优异的气密性

■ 用途

- 使用于控制摩托车、汽车的F1 (电子燃料喷射) 系统
- 用于测量吸入空气的温度

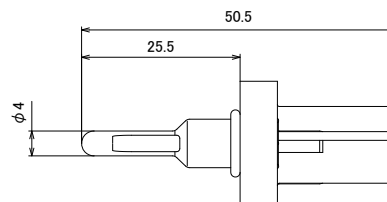
Automotive products

Intake Air Temperature Sensor (IAT)



IAT-40

形状・尺寸 Dimensions(mm)



- Operating temperature $-30^{\circ}\text{C} \sim +120^{\circ}\text{C}$
- Resistance $R_{100}=0.1553\text{k}\Omega$
- B-Value $B_{50/100}=3854\text{K}$
- Thermal constant $\tau=6\text{sec}$ (in stirred water)

Shape, electrical characteristics, among others is customizable.

■ Features

- Integrated waterproof connector sensor
- Easy and reliable attaching with screws
- Precise temperature measuring
- Quick response (6 sec)
- Tough against extreme heat cycling and vibration
- Double molding makes for airtight construction

■ Applications

- Electronic fuel injection for motorcycles or automobiles
- Measuring air intake temperature for industrial or household applications

热敏传感器

THERMISTOR SENSORS

汽车

用于汽车空调（蒸发器）

CAE-60



- 电阻值 $R_0=4.852k\Omega \pm 5\%$
- B值(6D) $B_{25/50}=3930K \pm 3\%$
 $B_{25/85}=3941K$
- 使用温度范围 $-30^{\circ}C \sim +100^{\circ}C$
- 热响应时间常数(水中) 4sec.

■特点

- 防湿性能优异。
- 小型、温度响应快。

※关于R-T数据，请参阅本公司网站。
※有关热敏温度传感器的使用环境条件，请与本公司协商。

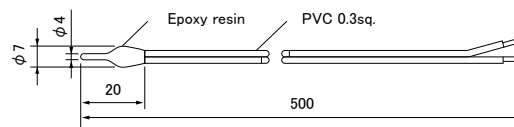
Automotive products

For car air conditioner (Evaporator)



CAE-60

形状・尺寸 Dimensions(mm)



- Resistance $R_0=4.852k\Omega \pm 5\%$
- B value (6D) $B_{25/50}=3930K \pm 3\%$
 $B_{25/85}=3941K$
- Operating temperature range $-30^{\circ}C \sim +100^{\circ}C$
- Thermal time constant (in water) ... 4sec.

■Features

- Moisture resistant.
- Small with quick temperature response.

※Regarding R-T data, please refer to our web site.
※Please consult us regarding the operating conditions of Thermistor sensors.

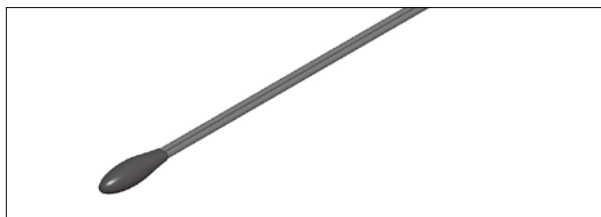
热敏传感器

THERMISTOR SENSORS

白色家电

用于空调气温

ACA-30



ACA-30

- 电阻值 $R_{25}=5k\Omega \pm 3\%$
- B值(3T) $B_{25/50}=3950K \pm 2\%$
 $B_{25/85}=3989K$
- 使用温度范围 $-30^{\circ}C \sim +100^{\circ}C$
- 热响应时间常数(空气中) 25sec.

ACA-35



ACA-35

- 电阻值 $R_{25}=15k\Omega \pm 3\%$
- B值(3T) $B_{25/50}=3950K \pm 2\%$
 $B_{25/85}=3989K$
- 使用温度范围 $-30^{\circ}C \sim +100^{\circ}C$
- 热响应时间常数(空气中) 50sec.

■特点

- 防湿性能优异。
- 小型、温度响应快。

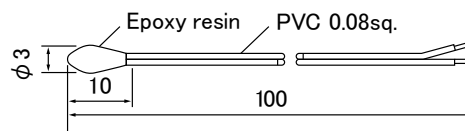
※关于R-T数据, 请参阅本公司网站。
※有关热敏温度传感器的使用环境条件, 请与本公司协商。

Home Appliance

For Air Temp of Air conditioner

ACA-30

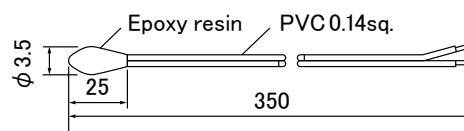
形状・尺寸 Dimensions(mm)



- Resistance $R_{25}=5k\Omega \pm 3\%$
- B value (3T) $B_{25/50}=3950K \pm 2\%$
 $B_{25/85}=3989K$
- Operating temperature range $-30^{\circ}C \sim +100^{\circ}C$
- Thermal time constant (in air) 25sec.

ACA-35

形状・尺寸 Dimensions(mm)



- Resistance $R_{25}=15k\Omega \pm 3\%$
- B value (3T) $B_{25/50}=3950K \pm 2\%$
 $B_{25/85}=3989K$
- Operating temperature range $-30^{\circ}C \sim +100^{\circ}C$
- Thermal time constant (in air) 50sec.

■Features

- Moisture resistant.
- Small with quick temperature response.

※Regarding R-T data, please refer to our web site.
※Please consult us regarding the operating conditions of Thermistor sensors.

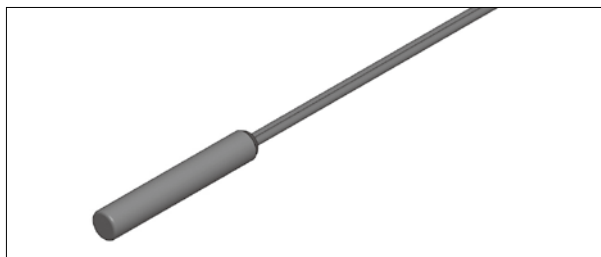
热敏传感器

THERMISTOR SENSORS

白色家电

用于空调热交换器

ACH-40/42/45/60



ACH-40/42/45/60

- 电阻值 $R_{25}=10k\Omega \pm 3\%$
- B值(3T) $B_{25/50}=3950K \pm 2\%$
 $B_{25/85}=3989K$
- 使用温度范围 $-30^{\circ}C \sim +100^{\circ}C$
- 热响应时间常数(水中) ACH-40,42 : 4.5sec.
ACH-45 : 5sec.
ACH-60 : 10sec.

■ 特点

- 防湿性能优异。
- 小型、温度响应快。

※关于R-T数据, 请参阅本公司网站。
※有关热敏温度传感器的使用环境条件, 请与本公司协商。

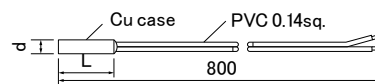
Home Appliance

For Heat Exchanger of Air conditioner

ACH-40/42/45/60



形状・尺寸 Dimensions(mm)



d (mm)	φ 4.0	φ 4.2	φ 4.5	φ 6.0
L (mm)	24	25	25	24

- Resistance $R_{25}=10k\Omega \pm 3\%$
- B value (3T) $B_{25/50}=3950K \pm 2\%$
 $B_{25/85}=3989K$
- Operating temperature range $-30^{\circ}C \sim +100^{\circ}C$
- Thermal time constant (in water) ... ACH-40,42 : 4.5sec.
ACH-45 : 5sec.
ACH-60 : 10sec.

■ Features

- Moisture resistant.
- Small with quick temperature response.

※Regarding R-T data, please refer to our web site.
※Please consult us regarding the operating conditions of Thermistor sensors.

热敏传感器

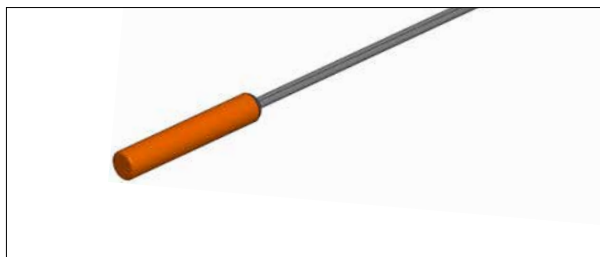
THERMISTOR SENSORS



白色家电

用于空调排气管

ACD-45



- 电阻值 $R_{90}=5k\Omega \pm 3\%$
- B值(3U) $B_{25/50}=3950K \pm 3\%$
 $B_{25/85}=4025K$
- 使用温度范围 $-30^{\circ}C \sim +130^{\circ}C$
- 热响应时间常数(水中) 5sec.

■特点

- 防湿性能优异。
- 小型、温度响应快。

※关于R-T数据，请参阅本公司网站。
※有关热敏温度传感器的使用环境条件，请与本公司协商。

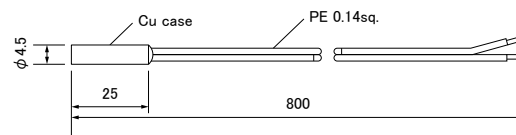
Home Appliance

For Delivery pipe of Air conditioner



ACD-45

形状・尺寸 Dimensions(mm)



- Resistance $R_{90}=5k\Omega \pm 3\%$
- B value (3U) $B_{25/50}=3950K \pm 3\%$
 $B_{25/85}=4025K$
- Operating temperature range $-30^{\circ}C \sim +130^{\circ}C$
- Thermal time constant (in water) .. 5sec.

■Features

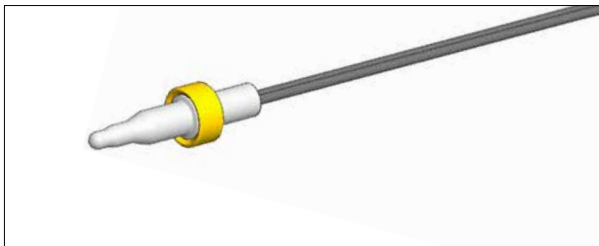
- Moisture resistant.
- Small with quick temperature response.

※Regarding R-T data, please refer to our web site.
※Please consult us regarding the operating conditions of Thermistor sensors.

水暖设备

用于开水器

IBS-25



- 电阻值····· $R_{50}=3.485k\Omega \pm 2.5\%$
- B 值 (6QR)····· $B_{25/50}=3423K \pm 1\%$
 $B_{25/85}=3468K$
- 使用温度范围····· $-30^{\circ}C \sim +105^{\circ}C$
- 热响应时间常数 (水中)····· 0.8sec.

■特点

- 耐热冲击性能优异
- 温度响应快
- 不锈钢外壳，耐腐蚀性能优异

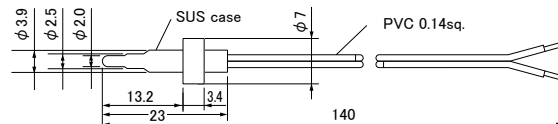
※ 关于 R-T 数据，请参阅本公司网站。
※ 有关热敏温度传感器的使用环境条件，请与本公司协商。

Used in Water

For Instant boiler

IBS-25

形状・尺寸 Dimensions(mm)



- Resistance····· $R_{50}=3.485k\Omega \pm 2.5\%$
- B value (6QR)····· $B_{25/50}=3423K \pm 1\%$
 $B_{25/85}=3468K$
- Operating temperature range····· $-30^{\circ}C \sim +105^{\circ}C$
- Thermal time constant (in water)··· 0.8sec.

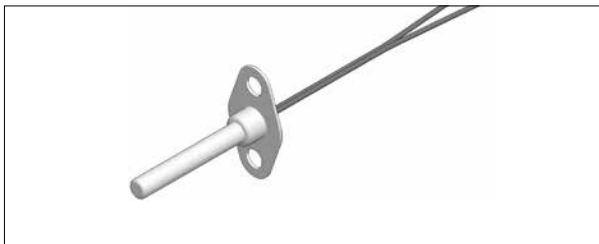
■Features

- Resistant to heat shock.
- Quick temperature response.
- Stainless steel case makes resistant to corrosion.

※ Regarding R-T data, please refer to our web site.
※ Please consult us regarding the operating conditions of Thermistor sensors.

温水器用

HBS-45



- 电阻值····· $R_{25}=11k\Omega \pm 3\%$
- B 值 (3T)····· $B_{25/50}=3950K \pm 2\%$
 $B_{25/85}=3989K$
- 使用温度范围····· $-30^{\circ}C \sim +100^{\circ}C$
- 热响应时间常数 (水中)····· 3sec.

■特点

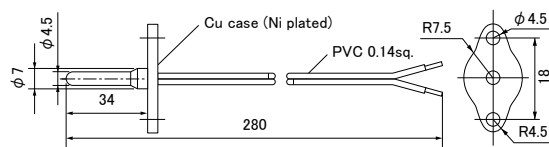
- 防湿性能优异

※ 关于 R-T 数据，请参阅本公司网站。
※ 有关热敏温度传感器的使用环境条件，请与本公司协商。

For Hot boiler

HBS-45

形状・尺寸 Dimensions(mm)



- Resistance····· $R_{25}=11k\Omega \pm 3\%$
- B value (3T)····· $B_{25/50}=3950K \pm 2\%$
 $B_{25/85}=3989K$
- Operating temperature range····· $-30^{\circ}C \sim +100^{\circ}C$
- Thermal time constant (in water)··· 3sec.

■Features

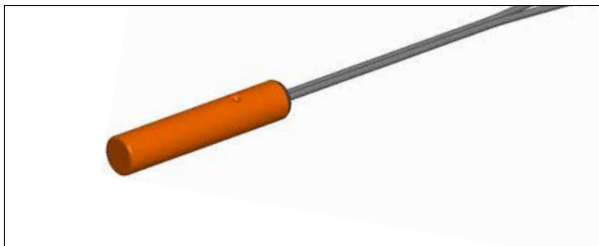
- Moisture resistant.

※ Regarding R-T data, please refer to our web site.
※ Please consult us regarding the operating conditions of Thermistor sensors.

水暖设备

用于洗衣机

WDS-60



- 电阻值 $R_{100}=3.3k\Omega\pm3\%$
- B值(6PR)..... $B_{25/100}=3999K\pm2\%$
- 使用温度范围 $-30^{\circ}C\sim+150^{\circ}C$
- 热响应时间常数(水中)..... 10sec.

■特点

- 耐热性能优异。
- 防湿性能优异。

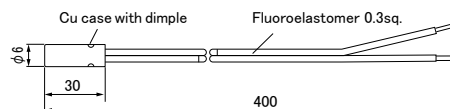
※关于R-T数据, 请参阅本公司网站。
※有关热敏温度传感器的使用环境条件, 请与本公司协商。

Used in Water

For Washing machine

WDS-60

形状・尺寸 Dimensions(mm)



- Resistance $R_{100}=3.3k\Omega\pm3\%$
- B value (6PR)..... $B_{25/100}=3999K\pm2\%$
- Operating temperature range $-30^{\circ}C\sim+150^{\circ}C$
- Thermal time constant (in water) ... 10sec.

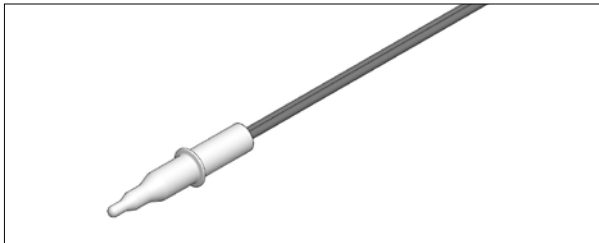
■Features

- Resistance to high temperature.
- Moisture resistant.

※Regarding R-T data, please refer to our web site.
※Please consult us regarding the operating conditions of Thermistor sensors.

用于智能座便

WTS-15



- 电阻值 $R_{37}=29.46k\Omega\pm3\%$
- B值(6PR)..... $B_{25/50}=3948K\pm1.5\%$
 $B_{25/85}=3984K$
- 使用温度范围 $-30^{\circ}C\sim+105^{\circ}C$
- 热响应时间常数 (水中) 0.5sec.

■特点

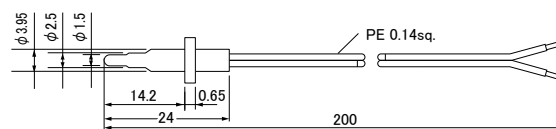
- 热灵敏性极高。
- 不锈钢外壳, 耐腐蚀性能优异。

※关于R-T数据, 请参阅本公司网站。
※有关热敏温度传感器的使用环境条件, 请与本公司协商。

For Bidet

WTS-15

形状・尺寸 Dimensions(mm)



- Resistance $R_{37}=29.46k\Omega\pm3\%$
- B value (6PR)..... $B_{25/50}=3948K\pm1.5\%$
 $B_{25/85}=3984K$
- Operating temperature range $-30^{\circ}C\sim+105^{\circ}C$
- Thermal time constant (in water) ... 0.5sec.

■Features

- Ultra quick temperature response.
- Stainless steel case makes resistant to corrosion.

※Regarding R-T data, please refer to our web site.
※Please consult us regarding the operating conditions of Thermistor sensors.

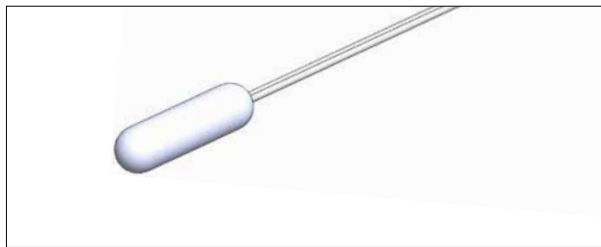
热敏传感器

THERMISTOR SENSORS

白色家电

用于电冰箱

RFG-70



- 电阻值····· $R_0=6.4k\Omega \pm 3\%$
- B 值 (3T) ····· $B_{0/25}=3844K \pm 2\%$
 $B_{-20/0}=3840K$
- 使用温度范围····· $-40^{\circ}C \sim +80^{\circ}C$
- 热响应时间常数 (水中)····· 25sec.

■特点

- 吸湿率小、耐绝缘性、热冲击性优异
- 精度高、可靠性高 (耐迁移性、热冲击性等)
- 可在冷藏室、冷冻室使用

※ 关于 R-T 数据, 请参阅本公司网站。

※ 有关热敏温度传感器的使用环境条件, 请与本公司协商。

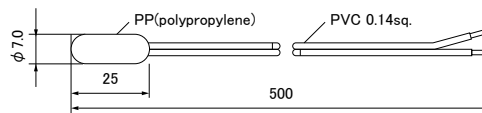
Home Appliance

For Refrigerator



RFG-70

形状・尺寸 Dimensions(mm)



- Resistance····· $R_0=6.4k\Omega \pm 3\%$
- B value (3T)····· $B_{0/25}=3844K \pm 2\%$
 $B_{-20/0}=3840K$
- Operating temperature range····· $-40^{\circ}C \sim +80^{\circ}C$
- Thermal time constant (in water)··· 25sec.

■Features

- Low water absorption rate, superior electrical insulation and thermal shock resistance.
- High accuracy and high reliability (Anti-migration, Thermal shock)
- For refrigerator compartment or freezer compartment

※Regarding R-T data, please refer to our web site.

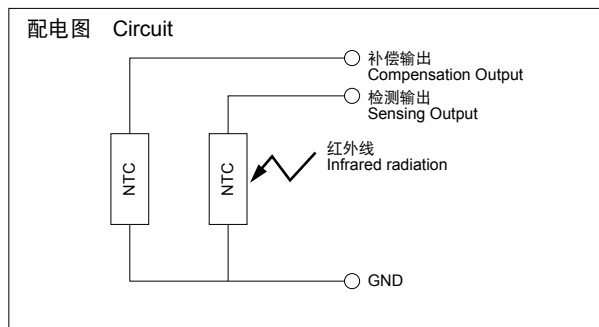
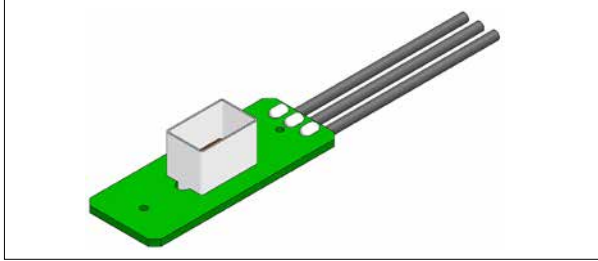
※Please consult us regarding the operating conditions of Thermistor sensors.



非接触式温度传感器

DNS 系列

非接触式温度传感器 DNS 系列产品通过非接触方式检测目标物体温度，是一种采用热敏方式的红外线温度传感器。



特点

- 通过超高精度的热敏电阻，实现了高的检测精度。
- 通过本公司特有的检出部构造，实现了高感度和高速响应性。
- 实现了高耐热性、耐 ESD 性。
- 实现了传感器的小型化、轻量化。

特性

- 热敏电阻特性：
 - 零负载电阻值 $R_{25}=100k\Omega$ (typ.)
 - B 值 $B_{25/50} = 4,250K$ (typ.)
- 使用温度范围 $-30^{\circ}C \sim 125^{\circ}C$ ※2
- 温度检测范围 $0^{\circ}C \sim 400^{\circ}C$ ※3
- 响应速度 (热响应时间常数) 大约 0.6 秒 ※4
- 视角 $89.4^{\circ} \times 107.7^{\circ}$

※1: 根据与传感器的距离、目标物体表面材质、面积、形状、空气对流等条件精度会有所变化。

※2: 无结露现象。

※3: 应在传感器使用范围内使用。

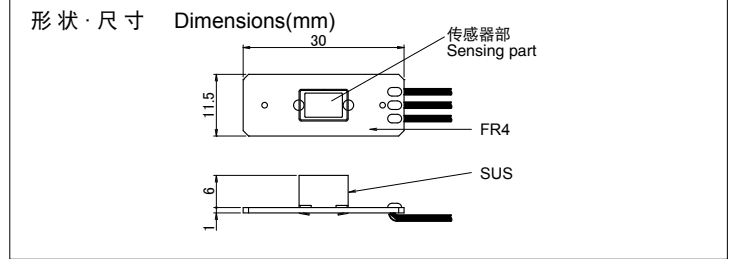
※4: 检测温度达到黑体温度63.2%的时间。

Non-Contact Temperature Sensor

DNS Series



Our DNS Series non-contact temperature sensor measures an objects temperature without touching it by using its infrared radiation.



Features

- Our precise thermistor is able to accurately measure the temperature
- Our unique output structure enables high precision and fast response time
- Tough against high temperatures and ESD
- Reduced dimensions and weight

Characteristics

- Thermistor Characteristics $R_{25} = 100k\Omega$ (typ.)
 $B_{25/50} = 4,250K$ (typ.)
- Operating Temperature Range $-30^{\circ}C$ to $125^{\circ}C$ ※2
- Detection Temperature Range $0^{\circ}C$ to $400^{\circ}C$ ※3
- Response Time (when warm) approximately 0.6 sec. ※4
- Sensing Angle $89.4^{\circ} \times 107.7^{\circ}$

※1 : Accuracy affected by type of material, area, shape, distance, and airflow

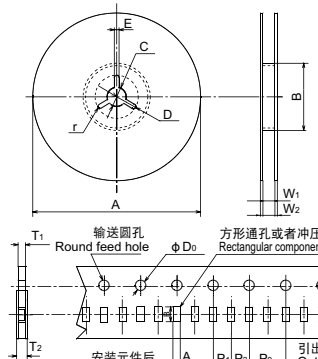
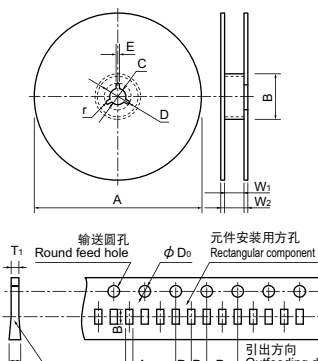
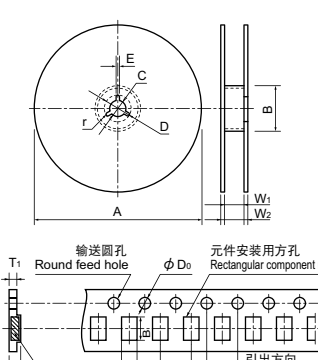
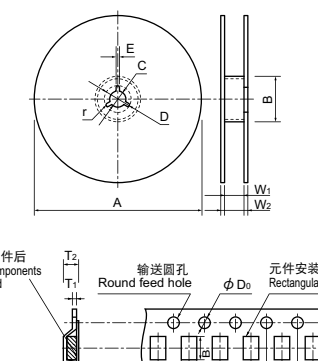
※2 : Without any condensation

※3 : Sensor unit must be within operating temperature range

※4 : When it detects => 63.2% of black body temperature

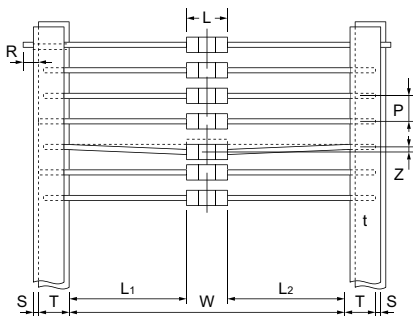
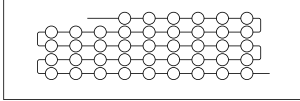
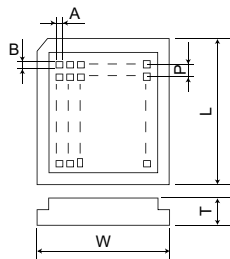
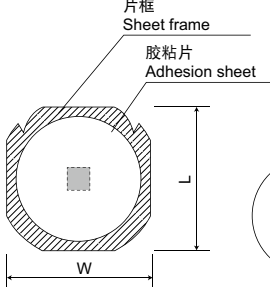
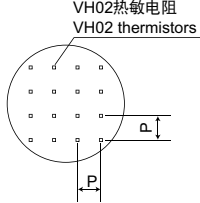
单位: mm Unit: mm

■ 包装形式 Packing form

包装记号 Packing code	型号 Part number	包装数量 Packing Qty.	包 装 形 式 Packing form																																																
D	TH03 TX03	15,000	 <table><tr><th>记号 Code</th><th>A</th><th>B</th><th>C</th><th>D</th><th>E</th><th>W₁</th><th>W₂</th><th>r</th></tr><tr><td>RRM08B</td><td>φ 180 +0 -3</td><td>φ 60 +1 -0</td><td>φ 13.0 ±0.2</td><td>R10.5 ±0.4</td><td>2.0 ±0.5</td><td>9.0 ±0.3</td><td>11.4 ±1.0</td><td>0.5</td></tr></table><table><tr><th>A</th><th>B</th><th>W</th><th>F</th><th>E</th><th>P₁</th></tr><tr><td>0.37 ±0.08</td><td>0.67 ±0.08</td><td>8.0 ±0.3</td><td>3.50 ±0.05</td><td>1.75 ±0.10</td><td>2.0 ±0.1</td></tr></table><table><tr><th>P₂</th><th>P₀</th><th>D₀</th><th>T₁</th><th>T₂</th><th>安装孔 Loading hole</th></tr><tr><td>2.0 ±0.1</td><td>4.0 ±0.1</td><td>φ 1.5 +0.1 -0</td><td>0.4 以下 max</td><td>0.5 以下 max</td><td>方形通孔 Rectangular hole 或者 冲压凹孔 Press pocket</td></tr></table>	记号 Code	A	B	C	D	E	W ₁	W ₂	r	RRM08B	φ 180 +0 -3	φ 60 +1 -0	φ 13.0 ±0.2	R10.5 ±0.4	2.0 ±0.5	9.0 ±0.3	11.4 ±1.0	0.5	A	B	W	F	E	P ₁	0.37 ±0.08	0.67 ±0.08	8.0 ±0.3	3.50 ±0.05	1.75 ±0.10	2.0 ±0.1	P ₂	P ₀	D ₀	T ₁	T ₂	安装孔 Loading hole	2.0 ±0.1	4.0 ±0.1	φ 1.5 +0.1 -0	0.4 以下 max	0.5 以下 max	方形通孔 Rectangular hole 或者 冲压凹孔 Press pocket						
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R	TZ05 TX05 TD05 TN05 TC05 TH05	10,000	 <table><tr><th>记号 Code</th><th>A</th><th>B</th><th>C</th><th>D</th><th>E</th><th>W₁</th><th>W₂</th><th>r</th></tr><tr><td>RRM08B</td><td>φ 180 +0 -3</td><td>φ 60 +1 -0</td><td>φ 13.0 ±0.2</td><td>R10.5 ±0.4</td><td>2.0 ±0.5</td><td>9.0 ±0.3</td><td>11.4 ±1.0</td><td>0.5</td></tr></table><table><tr><th>A</th><th>B</th><th>W</th><th>F</th><th>E</th><th>P₁</th></tr><tr><td>0.62 ±0.10</td><td>1.15 ±0.10</td><td>8.0 ±0.3</td><td>3.50 ±0.05</td><td>1.75 ±0.10</td><td>2.0 ±0.1</td></tr></table><table><tr><th>P₂</th><th>P₀</th><th>D₀</th><th>T₁</th><th>T₂</th><th>安装孔 Loading hole</th></tr><tr><td>2.00 ±0.05</td><td>4.0 ±0.1</td><td>φ 1.5 +0.1 -0</td><td>0.8 以下 max</td><td>0.9 以下 max</td><td>方形通孔 Rectangular hole</td></tr></table>	记号 Code	A	B	C	D	E	W ₁	W ₂	r	RRM08B	φ 180 +0 -3	φ 60 +1 -0	φ 13.0 ±0.2	R10.5 ±0.4	2.0 ±0.5	9.0 ±0.3	11.4 ±1.0	0.5	A	B	W	F	E	P ₁	0.62 ±0.10	1.15 ±0.10	8.0 ±0.3	3.50 ±0.05	1.75 ±0.10	2.0 ±0.1	P ₂	P ₀	D ₀	T ₁	T ₂	安装孔 Loading hole	2.00 ±0.05	4.0 ±0.1	φ 1.5 +0.1 -0	0.8 以下 max	0.9 以下 max	方形通孔 Rectangular hole						
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T	TD11 TN11 TH11 TN10 TC10 TN20 TC20 TH20	4,000	 <table><tr><th>记号 Code</th><th>A</th><th>B</th><th>C</th><th>D</th><th>E</th><th>W₁</th><th>W₂</th><th>r</th></tr><tr><td>RRM08B</td><td>φ 180 +0 -3</td><td>φ 60 +1 -0</td><td>φ 13.0 ±0.2</td><td>R10.5 ±0.4</td><td>2.0 ±0.5</td><td>9.0 ±0.3</td><td>11.4 ±1.0</td><td>0.5</td></tr></table><table><tr><th>A</th><th>B</th><th>W</th><th>F</th><th>E</th><th>P₁</th></tr><tr><td>1.62 ±0.2</td><td>2.4 ±0.2</td><td>8.0 ±0.3</td><td>3.50 ±0.05</td><td>1.75 ±0.10</td><td>4.0 ±0.1</td></tr><tr><td>(1.0) ±0.2</td><td>(1.8) ±0.2</td><td></td><td></td><td></td><td></td></tr></table><table><tr><th>P₂</th><th>P₀</th><th>D₀</th><th>T₁</th><th>T₂</th><th>安装孔 Loading hole</th></tr><tr><td>2.00 ±0.05</td><td>4.0 ±0.1</td><td>φ 1.5 +0.1 -0</td><td>1.1 以下 max</td><td>1.4 以下 max</td><td>方形通孔 Rectangular hole</td></tr></table> ※ () 内的数值是TN11、TH11、TN10、TC10、SC10的尺寸。 ※Dimensions in () are for TN11, TH11, TN10, TC10, SC10.	记号 Code	A	B	C	D	E	W ₁	W ₂	r	RRM08B	φ 180 +0 -3	φ 60 +1 -0	φ 13.0 ±0.2	R10.5 ±0.4	2.0 ±0.5	9.0 ±0.3	11.4 ±1.0	0.5	A	B	W	F	E	P ₁	1.62 ±0.2	2.4 ±0.2	8.0 ±0.3	3.50 ±0.05	1.75 ±0.10	4.0 ±0.1	(1.0) ±0.2	(1.8) ±0.2					P ₂	P ₀	D ₀	T ₁	T ₂	安装孔 Loading hole	2.00 ±0.05	4.0 ±0.1	φ 1.5 +0.1 -0	1.1 以下 max	1.4 以下 max	方形通孔 Rectangular hole
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P	MN18 MH18	2,000	 <table><tr><th>记号 Code</th><th>A</th><th>B</th><th>C</th><th>D</th><th>E</th><th>W₁</th><th>W₂</th><th>r</th></tr><tr><td>R10</td><td>φ 178 ±2.0</td><td>φ 50min.</td><td>φ 13.0 ±0.5</td><td>φ 21.0 ±0.8</td><td>2.0 ±0.5</td><td>10.0 ±1.5</td><td>10.8 ±1.7</td><td>1.0</td></tr></table><table><tr><th>A</th><th>B</th><th>W</th><th>F</th><th>E</th><th>P₁</th></tr><tr><td>1.7 ±0.2</td><td>4.1 ±0.2</td><td>8.0 ±0.3</td><td>3.55 ±0.1</td><td>1.5 ±0.1</td><td>4.0 ±0.1</td></tr></table><table><tr><th>P₂</th><th>P₀</th><th>D₀</th><th>T₁</th><th>T₂</th><th>安装孔 Loading hole</th></tr><tr><td>2.00 ±0.05</td><td>4.0 ±0.1</td><td>φ 1.5 +0.1 -0</td><td>0.5 以下 max</td><td>2.0 以下 max</td><td>方形通孔 Rectangular hole</td></tr></table>	记号 Code	A	B	C	D	E	W ₁	W ₂	r	R10	φ 178 ±2.0	φ 50min.	φ 13.0 ±0.5	φ 21.0 ±0.8	2.0 ±0.5	10.0 ±1.5	10.8 ±1.7	1.0	A	B	W	F	E	P ₁	1.7 ±0.2	4.1 ±0.2	8.0 ±0.3	3.55 ±0.1	1.5 ±0.1	4.0 ±0.1	P ₂	P ₀	D ₀	T ₁	T ₂	安装孔 Loading hole	2.00 ±0.05	4.0 ±0.1	φ 1.5 +0.1 -0	0.5 以下 max	2.0 以下 max	方形通孔 Rectangular hole						
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2.00 ±0.05	4.0 ±0.1	φ 1.5 +0.1 -0	0.5 以下 max	2.0 以下 max	方形通孔 Rectangular hole																																														

单位: mm Unit: mm

■ 包装形式 Packing form

包装记号 Packing code	型号 Part number	包装数量 Packing Qty.	包 装 形 式 Packing form																								
B	TH03, TX03, TN05, TC05, TH05, TZ05, TX05, TD05, TN10, TC10, TN11, TH11,TD11, TN20, TC20, TH20,	500	塑料袋 Plastic bag 																								
	MN18, MH18, GA13, GH13, GA20, GH20, CN25, CH25, GR15, BM38, BM22, BM18, RH18	200																									
	GR25	100																									
F	GA13 GH13 GA20 GH20	2,000	 产品引出方向(从侧面看) Feed direction (Side view)  <table><tr><th>记号 Code</th><th>尺 寸 Dimensions</th><th>记号 Code</th><th>尺 寸 Dimensions</th></tr><tr><td>L</td><td>[GA13,GH13]2.5 ^{+0.2}_{-0.4} [GA20,GH20]4.0 ^{+0.2}_{-0.4}</td><td>T</td><td>6.0±1.0</td></tr><tr><td>W</td><td>52.0 ^{+0.2}_{-1.0}</td><td>Z</td><td>1.5max.</td></tr><tr><td>P</td><td>5.0±0.5</td><td>R</td><td>不可露出带外 Not sticking out of tape</td></tr><tr><td>L1-L2</td><td>1.0max.</td><td>t</td><td>3.2min.</td></tr><tr><td></td><td></td><td>S</td><td>0.8max.</td></tr></table>	记号 Code	尺 寸 Dimensions	记号 Code	尺 寸 Dimensions	L	[GA13,GH13]2.5 ^{+0.2} _{-0.4} [GA20,GH20]4.0 ^{+0.2} _{-0.4}	T	6.0±1.0	W	52.0 ^{+0.2} _{-1.0}	Z	1.5max.	P	5.0±0.5	R	不可露出带外 Not sticking out of tape	L1-L2	1.0max.	t	3.2min.			S	0.8max.
记号 Code	尺 寸 Dimensions	记号 Code	尺 寸 Dimensions																								
L	[GA13,GH13]2.5 ^{+0.2} _{-0.4} [GA20,GH20]4.0 ^{+0.2} _{-0.4}	T	6.0±1.0																								
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		S	0.8max.																								
C	VH05 VH10 LN10	400	 外壳 Plastic cover 底板 Tray → 夹板 Clip <table><tr><th>记号 Code</th><th>尺 寸 Dimensions</th><th>凹空深度 depth of pockets</th><th>凹孔数(个) quantity of pockets(pcs.)</th></tr><tr><td>A,B</td><td>[VH05]0.38 [VH10]0.66</td><td>[VH05]0.23</td><td rowspan="4">400(20×20)</td></tr><tr><td>P</td><td>2.16</td><td rowspan="3">[VH10]0.30 or 0.38</td></tr><tr><td>L,W</td><td>50.8</td></tr><tr><td>T</td><td>3.96</td></tr></table>	记号 Code	尺 寸 Dimensions	凹空深度 depth of pockets	凹孔数(个) quantity of pockets(pcs.)	A,B	[VH05]0.38 [VH10]0.66	[VH05]0.23	400(20×20)	P	2.16	[VH10]0.30 or 0.38	L,W	50.8	T	3.96									
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S	VH02	400	 片框 Sheet frame 胶粘片 Adhesion sheet VH02热敏电阻 VH02 thermistors  <table><tr><th>记号 Code</th><th>尺寸 Dimensions</th><th>数量 Qty.</th></tr><tr><td>L, W</td><td>217</td><td>400</td></tr><tr><td>P</td><td>2.0</td><td>(20×20)</td></tr></table>	记号 Code	尺寸 Dimensions	数量 Qty.	L, W	217	400	P	2.0	(20×20)															
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P	2.0	(20×20)																									

推荐焊接条件

RECOMMEND SOLDERING CONDITIONS

型号 Part number	焊接条件 Soldering conditions
CSA20 CSA30 CSA70 CDA70	推荐温度曲线 Recommended Temperature Profile 流体焊接 Flow soldering conditions 共晶焊接时 Eutectic Solder 无铅焊接时 Lead free Solder 1) 保持时间为元件表面温度达到上述温度后起算的时间。 2) ΔT应在100°C以内。 3) 焊接后切勿迅速冷却，而应缓慢冷却。 1) Time shown in the above figures is measured from the point when chip surface reaches temperature. 2) Temperature difference in high temperature part should be within 100°C. 3) After soldering, do not force cool, allow the parts to cool gradually. 回流焊接 Reflow soldering conditions 共晶焊接时 Eutectic Solder 无铅焊接时 Lead free Solder 1) 保持时间为元件表面温度达到上述温度后起算的时间。 2) ΔT应在100°C以内。 3) 焊接后切勿迅速冷却，而应缓慢冷却。 1) Time shown in the above figures is measured from the point when chip surface reaches temperature. 2) Temperature difference in high temperature part should be within 100°C. 3) After soldering, do not force cool, allow the parts to cool gradually. ※1 仅可进行回流焊接 ※2 仅为镀锡品或仅适用于流动焊接。 其它产品请在规格书所记载的条件下使用。 ※1 Reflow only ※2 Tin plated only, and flow only. Soldering method of the other products refer to the individual specification.
TH03 TX03 TN05 TC05 TH05 TD05 TX05 TZ05 TN11 TH11 TD11 TN10 TC10 TN20 TC20 TH20 MN18 MH18 GA13 GA20 GH13 GH20	※1

【焊接时的一般注意事项】

- 若焊接温度过高、焊接时间过长，端子电极处可能会发生浸析，从而导致粘着力下降或性能劣化。
- 焊接时请参照上述温度曲线进行。
但超过200°C的温度应控制在50秒以内。
- 焊剂应使用低活性（Cl含有率在0.2wt%以下）的产品。如果焊剂为水溶性、且清洗不充分的话，可能会损伤元件下部的绝缘，应予以注意。

【清洗】

用超声波进行清洗时，输出过大会引起主板共振，振动可能会造成主板破裂或端子电极粘着力下降。故此，推荐按以下条件进行清洗。

频率：40kHz以下
输出：20W/l
清洗时间：5分钟以内

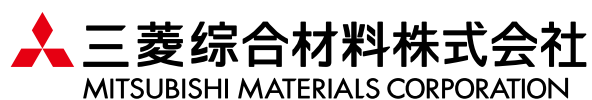
General attention to soldering

- High soldering temperatures and long soldering times can cause leaching of the termination, decrease in adherence strength, and the change of characteristic may occur.
- For soldering, please refer to the soldering curves above.
However, please keep exposure to temperatures exceeding 200°C to under 50 seconds.
- Please use a mild flux(containing less than 0.2wt% Cl). Also, if the flux is water soluble, be sure to wash thoroughly to remove any residue from the underside of components, that could affect resistance.

Cleaning

When using ultrasonic cleaning, the board may resonate if the output power is too high. Since this vibration can cause cracking or a decrease in the adherence of the termination, we recommend that you use the conditions below.

Frequency: 40kHz max.
Output power: 20W/liter
Cleaning time: 5minutes max.



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