

# ELECTRONIC COMPONENTS

**MITSUBISHI**  
▲ MITSUBISHI MATERIALS CORPORATION



电子部品总目录 2011

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- 
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  - 未经许可，禁止翻印。

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- 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.
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浪涌吸收器  
SURGE ABSORBER

EMI滤波器  
EMI FILTER




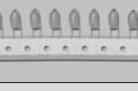




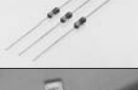


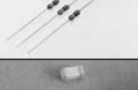

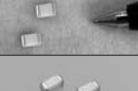





NTC热敏电阻  
NTC THERMISTOR

贴片天线  
CHIP ANTENNAS

推荐焊接条件  
RECOMMENDED  
SOLDERING  
CONDITIONS

## 产品系列

## Products Line up

	形状 Style	系列 Series	直流放电开始电压 DC Spark-over voltage	规格 standard	用途 Applications	页码 Page	
电源线用 For power Lines	导线型 Lead type	DA53		700~7,800V	UL CSA EN	2	
		DA38		1,000~6,200V	UL CSA EN	3	
		DSA		300~7,500V	UL CSA EN	4	
		DB60		2,700~4,500V	UL EN	5	
	复合型 Combination type	DSAHR		500~800V	-	SW电源、变频器电源、OA设备及家用电器的电源 SW power supply, Inverter power supply, Power supply of office and home appliance	6
		DSANR		500~4,500V	UL EN		7
		DSAZR		500~4,500V	UL CSA EN		8
通信线路用 For Communication Lines	导线型 Lead type	DE37		300~4,500V	UL EN ITU-T (400V)	9	
		DSS		200~3,000V	UL CSA EN	10~14	
	贴片型 Chip type	CDA70		3,000V	UL EN	15	
		CSA70		300~600V	UL ITU-T (400V)	16,17	
防静电用 For ESD	导线型 Lead type	DSP		140~3,000V	-	天线、显示器、监视器等 Antenna, CRT display, Monitor TV etc	18~21
	贴片型 Chip type	CSA30		140~400V	IEC61000-4-2	车载导航器、车用音响等 Car navigation, Car audio etc	22
		CSA20		140~400V	IEC61000-4-2		23
		CSA10		140V	IEC61000-4-2	24	
		CSZ30		200V	ISO10605	车辆ECU Automotive ECU	25
		CSZ20		200V	ISO10605		26
其他 Others	配电盘用 For Switch board	DLSP		-	-	控制柜等 Control box, etc	27
	压敏电阻 Ring Varistor	DRV		13~55V	-	消除各种小型直流电机的火花及防止噪声 Spark elimination and noise protection of various compact DC motors	28

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。

DA53 has a micro gap cut to an accuracy of several tens of microns in width for rapid response against induced lightning and electrostatic discharges. Allows performing the AC withstanding voltage test. This series are ideal for protecting power supplies against surge voltage.

■特点

- 结构极其小巧。(直径5.3mm, 长度10mm)
- 可适应各种AC耐压试验。
- 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。
- 无明显暗场所的特性差异。
- DA53系列可在各种电源电路中与压敏电阻组合使用。

■Features

- Small size. (ø5.3mm Length 10mm)
- Allows performing the AC withstanding voltage test.
- 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 combined with varistor can be used as surge-protecting elements in power supplies.

■型号构成 Part number system

DA53 - 622 M F - M 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      包装形式 Packing form      特殊记号 Special code

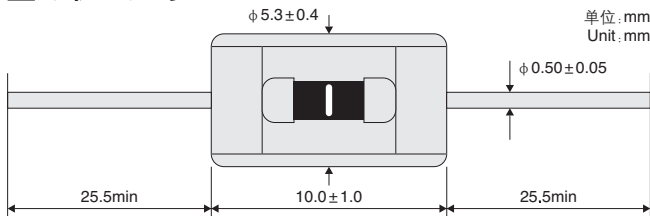
前2位数字表示电压值的有效数字, 第3位数字表示乘幂。  
The first two digits are significant, and the third is number of zeros.  
例) 622表示:  
Ex.) 622 means:  
62 × 10<sup>2</sup> = 6200v

M ±20%

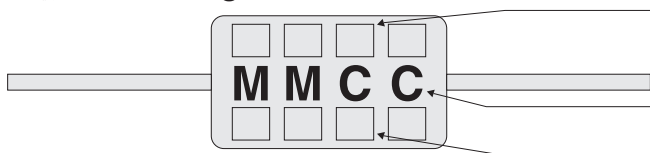
B	散装 Bulk pack
F	整体成形包装 Bulk Forming pack

记号 Code	说明 Description
无 None	包装形式为B Bulk pack
E15E	包装形式为F(成形形状为E), 导线间距15mm Bulk forming, Lead pitch 15mm
E25E	包装形式为F(成形形状为E), 导线间距25mm Bulk forming, Lead pitch 25mm

■形状·尺寸 Dimensions



■标记 Marking



- ① 批号(最多4位英文字母及数字)  
Lot No. (Number with four digits maximum)
- ② 商标 Trade mark
- ③ 型号略符(最多4位英文字母及数字)  
Part number (Number with four digits maximum)

■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.	浪涌耐量 Surge current capacity 8/20μsec.	浪涌寿命 Surge life test	AC耐压 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		
							5) UL1414	6) UL1449	7) C22.2 No.1	8) C22.2 No.60065	9) EN60065 EN60950-1		
DA53-701M	700V (560~840)	100MΩmin.	1pF max.	8/20μsec. 3,000A	8/20μsec. 100A 300times	-	-	○2)	-				
DA53-272M	2,700V (2,160~3,240)					DC 250V	AC1,000V-1min. AC1,200V-3sec.	○1)	○2)	○2)			
DA53-302M	3,000V (2,400~3,600)					DC 500V	AC1,500V-1min.	○1)	○2)	○2)			○4)
DA53-362M	3,600V (2,880~4,320)					DC 1,000V	AC1,800V-3sec.	○1)	○2)	○2)			○4)
DA53-622M	6,200V (4,960~7,440)						AC3,000V-3sec.	○1)	-	○2)	○3)	○4)	
DA53-752M	7,500V (6,000~9,000)						AC3,600V-3sec.	○1)	-	○2)	○3)	○4)	
DA53-782M	7,800V (6,240~9,360)	AC4,000V-1min.	○1)	-	-			○4)					

- 与压敏电阻(AC125V: V1mA ≥ 270V, 8 Joule Min at 2ms. AC250V: V1mA ≥ 470V, 8 Joule Min at 2ms)电气串接(导线绕焊、压接、焊接等)即可被认证。  
Approved if used together with a varistor (AC125V: V1mA ≥ 270V, 8 Joule Min at 2ms. AC250V: V1mA ≥ 470V, 8 Joule Min at 2ms), electrically connected in series by means such as twist and soldering, staking, welding etc.
- 与压敏电阻(AC125V: V1mA ≥ 270V, D ≥ ø5mm. AC250V: V1mA ≥ 470V, D ≥ ø5mm)电气串接(导线绕焊、压接、焊接等)即可被认证。  
Approved if used together with a varistor (AC125V: V1mA ≥ 270V, D ≥ ø5mm. AC250V: V1mA ≥ 470V, D ≥ ø5mm), electrically connected in series by means such as twist and soldering, staking, welding etc.
- 与压敏电阻(AC125V: V1mA ≥ 270V, D ≥ ø14mm. AC250V: V1mA ≥ 470V, D ≥ ø14mm)电气串接(导线绕焊、压接、焊接等)即可被认证。  
Approved if used together with a varistor (AC125V: V1mA ≥ 270V, D ≥ ø14mm. AC250V: V1mA ≥ 470V, D ≥ ø14mm), electrically connected in series by means such as twist and soldering, staking, welding etc.
- 与压敏电阻(V1mA ≥ 470V, D ≥ ø5mm)电气串接(导线绕焊、压接、焊接等)即可被认证。  
Approved if used together with a varistor (V1mA ≥ 470V, D ≥ ø5mm), electrically connected in series by means such as twist and soldering, staking, welding etc.
- UL Standard UL 1414 File No. E89615
- UL Standard UL 1449 File No. E318314
- CSA Standard C22.2 No.1 File No. CA111411
- CSA Standard C22.2 No.60065 File No. CA111411
- DA53 has received recognition to EN60065, EN60950-1 through TÜV. Report No. J9851289 (DA53-752M,782M), J9850855 (DA53-302M,362M,622M)

DA38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。

DA38 has a micro gap cut to an accuracy of several tens of microns in width for rapid response against induced lightning and electrostatic discharges. Allows performing the AC withstanding voltage test. This series are ideal for protecting power supplies against surge voltage.

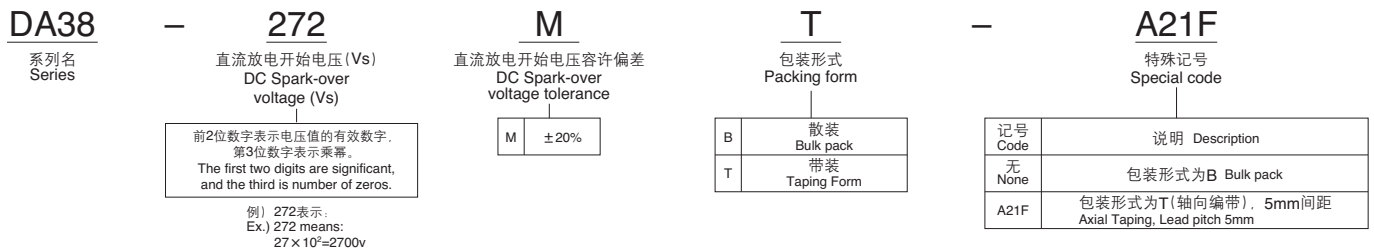
## ■特点

- 结构极其小巧。(直径3.8mm，长度10mm)
- 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。
- 可以轴向编带包装。
- 无极性。
- 无明暗场所的特性差异。
- DA38系列可在各种电源电路中与压敏电阻组合使用。

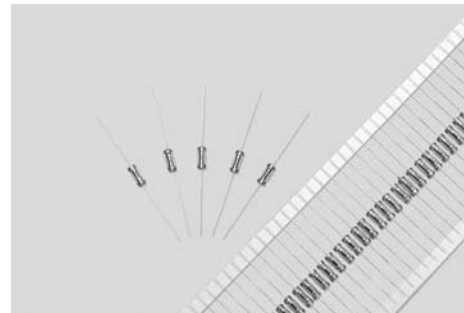
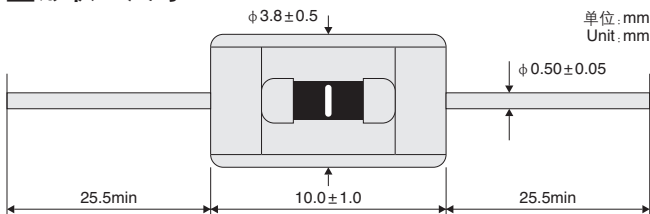
## ■Features

- Small size. (ø3.8mm Length 10mm)
- Allows performing the AC withstanding 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 taping available.
- No polarity.
- No dark effect.
- DA38 Series combined with varistor can be used as surge-protecting elements in power supplies.

## ■型号构成 Part number system



## ■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 capacity 1kHz-6V max.	浪涌耐量 Surge current capacity 8/20μsec.	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
								5) UL1414	6) UL1449	7) CSA C22.2	8) EN60065 EN60950-1
DA38-102M	1,000V (800~1,200)	100MΩmin.	DC 500V	1pF max.	8/20μsec. 2,000A	8/20μsec. 100A 300times	-	-	○3)	-	-
DA38-152M	1,500V (1,200~1,800)						-	-	○3)	-	-
DA38-272M	2,700V (2,160~3,240)						AC1,000V-1min. AC1,200V-3sec.	○1)	○3)	○3)	-
DA38-302M	3,000V (2,400~3,600)		AC1,500V-1min.		○1)		○3)	○3)	○4)		
DA38-362M	3,600V (2,880~4,320)		AC1,800V-3sec.		○1)		○3)	○3)	○4)		
DA38-452M	4,500V (3,600~5,400)		DC 1000V		AC2,000V-1min.		○2)	-	-	-	
DA38-622M	6,200V (4,960~7,440)	AC3,000V-1min.		○2)	-	-	-				

- 与压敏电阻 (AC125V : V1mA ≥ 270V, 8 Joule Min at 2ms. AC250V : V1mA ≥ 470V, 8 Joule Min at 2ms) 电气串接 (导线绕焊、压接、焊接等) 即可被认证。  
Approved if used together with a varistor (AC125V : V1mA ≥ 270V, 8 Joule Min at 2ms. AC250V : V1mA ≥ 470V, 8 Joule Min at 2ms), electrically connected in series by means such as twist and soldering, staking, welding etc.
- 与压敏电阻 (V1mA ≥ 470V, 8 Joule Min at 2ms) 电气串接 (导线绕焊、压接、焊接等) 即可被认证。  
Approved if used together with a varistor (V1mA ≥ 470V, 8 Joule Min at 2ms), electrically connected in series by means such as twist and soldering, staking, welding etc.
- 与压敏电阻 (AC125V : V1mA ≥ 270V, D ≥ ø5mm. AC250V : V1mA ≥ 470V, D ≥ ø5mm) 电气串接 (导线绕焊、压接、焊接等) 即可被认证。  
Approved if used together with a varistor (AC125V : V1mA ≥ 270V, D ≥ ø5mm. AC250V : V1mA ≥ 470V, D ≥ ø5mm), electrically connected in series by means such as twist and soldering, staking, welding etc.
- 与压敏电阻 (V1mA ≥ 470V, D ≥ ø5mm) 电气串接 (导线绕焊、压接、焊接等) 即可被认证。  
Approved if used together with a varistor (V1mA ≥ 470V, D ≥ ø5mm), electrically connected in series by means such as twist and soldering, staking, welding etc.
- UL Standard UL1414 File No.E89615
- UL Standard UL1449 File No.E318314
- CSA Standard C22.2 No1 File No. CA111411
- DA38 has received recognition to EN60065, EN60950-1 through TÜV. Report No. J9950875  
特殊规格另请商洽。  
Please consult us for available

■特点

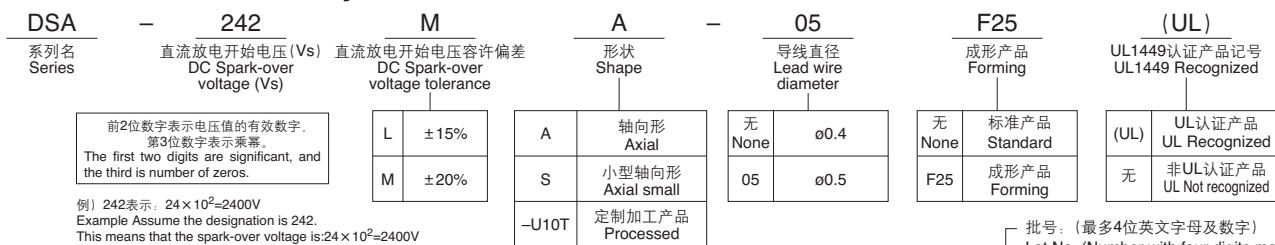
- 可广泛用于通信设备、传感线路等低电压低电流电路。
- 静电容量小，可用于信号线。
- DSA-A型可在各种电源电路中，与压敏电阻或指定的陶瓷电阻组合使用。
- 在电源电路中，无需拆下浪涌吸收器即可进行AC耐电压试验。(2,400V以上)
- DSA-A型与UL认证压敏电阻或指定的陶瓷电阻(RGBS5L-30K)组合后，可作为UL规格认证产品使用。(UL1449文件号E318314)

★部分型号已获得CSA、TÜV认证。详情请垂询本公司。

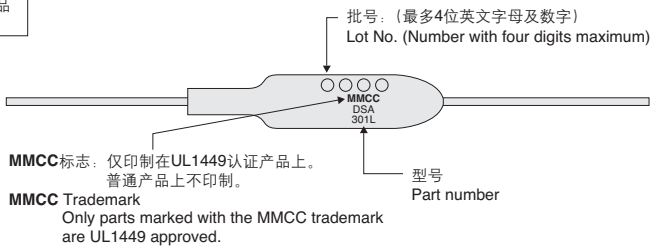
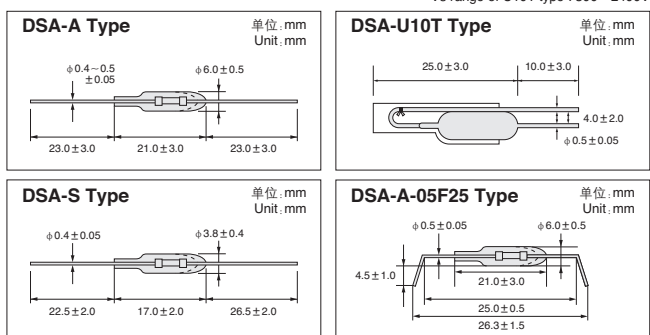
■Features

- The Models of this series are extensively used as surge-protecting elements for electronic equipment in low-voltage and low-current circuits such as telecommunication equipment and sensor lines.
- Excellent for protecting signal lines that require low capacitance.
- The DSA-A-type combined with varistor or a cement resistor can be used as surge-protecting elements in power supplies.
- Allows performing the AC withstanding voltage test without removal of the surge absorber.
- DSA A-type series displaying the "MMCC" trademark (except 402MA, 452MA) are UL-recognized protectors when connected to the appropriate varistor (UL recognized) or a cement resistor (RGBS5 30K) in-series. (UL1449 File No.E318314)
- ★Some models are approved by CSA, TÜV. Please contact us for details.

■型号构成 Part number system



■形状・尺寸 Dimensions



■特性 Characteristics

形状 Shape	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.	AC耐电压 AC Withstanding voltage	UL规格认证产品 UL recognized			CSA认证 (8) CSA approved	EN认证 (9) EN approved		
								5) UL1414	6) UL1449	7) UL1497B				
A-type	※DSA-301LA	300V(255~345)	100MΩmin.	2pF max.	导线直径 Lead wire diameter ø0.4mm :1500A	8/20μsec. 100A 300times	-	-	○2)	○	-	-		
	※DSA-501MA	500V(400~600)					DC100V	-	-	○2)	○	-	-	
	※DSA-701MA	700V(560~840)					DC250V	-	-	○2)	○	-	-	
	※DSA-102MA	1,000V(800~1,200)					DC500V	-	-	○2)	-	-	-	
	※DSA-152MA	1,500V(1,200~1,800)						-	-	○2)	-	-	-	
	※DSA-242MA	2,400V(1,920~2,880)						-	-	○1)	○2)	-	○3)	-
	DSA-282MA	2,800V(2,240~3,360)						-	-	○1)	○2)	-	○3)	-
	DSA-302MA	3,000V(2,400~3,600)						-	-	○1)	○2)	-	○3)	○4)
	DSA-332MA	3,300V(2,640~3,960)						-	-	○1)	○2)	-	○3)	○4)
	DSA-362MA	3,600V(2,880~4,320)						-	-	○1)	○2)	-	○3)	○4)
	DSA-402MA	4,000V(3,200~4,800)						-	-	○1)	-	-	○3)	○4)
	DSA-452MA	4,500V(3,600~5,400)						-	-	○1)	-	-	○3)	○4)
	DSA-622MA	6,200V(4,960~7,440)					DC1000V	-	-	○1)	-	○3)	○4)	
DSA-752MA	7,500V(6,000~9,000)	-	-	○1)	-	-	○3)	○4)						
S-type	DSA-301LS	300V(255~345)	DC100V	导线直径 ø0.4mm :1000A	-	-	-	-	-	-	-			
	DSA-501MS	500V(400~600)	DC250V		-	-	-	-	-	-				
	DSA-701MS	700V(560~840)	DC500V		-	-	-	-	-	-				
	DSA-102MS	1,000V(800~1,200)	-		-	-	-	-	-	-				

- 1): 与压敏电阻(AC125V: V1mA ≥ 270V, 8 Joule Min at 2ms. AC250V: V1mA ≥ 470V, 8 Joule Min at 2ms) 电气串接(导线绕焊、压接、焊接等)即可被认证。  
Approved if used together with a varistor (AC125V: V1mA ≥ 270V, 8 Joule Min at 2ms. AC250V: V1mA ≥ 470V, 8 Joule Min at 2ms), electrically connected in series by means such as twist and soldering, staking, welding etc.
  - 2): 与本公司指定的陶瓷电阻(AC125V RGBS5L-30K)电气串接(导线绕焊、压接、焊接等)即可被认证。包括UL认证压敏电阻(AC125V: V1mA ≥ 270V, D ≥ ø5mm), 电气串接(AC125V: V1mA ≥ 270V, D ≥ ø5mm)或一个UL认证压敏电阻(AC125V: V1mA ≥ 270V, D ≥ ø5mm), 电气串接(AC125V: V1mA ≥ 270V, D ≥ ø5mm), electrically connected in series by means such as twist and soldering, staking, welding etc.
  - 3): 与压敏电阻(AC125V: V1mA ≥ 270V, D ≥ ø5mm. AC250V: V1mA ≥ 470V, D ≥ ø5mm) 电气串接(导线绕焊、压接、焊接等)即可被认证。  
Approved if used together with a varistor (AC125V: V1mA ≥ 270V, D ≥ ø5mm. AC250V: V1mA ≥ 470V, D ≥ ø5mm), electrically connected in series by means such as twist and soldering, staking, welding etc.
  - 4): 与压敏电阻(压敏电阻电压(V1mA): 470V以上, 尺寸: ø10mm以上) 电气串接(导线绕焊、压接、焊接等)即可被认证。  
Approved if used together with a varistor (V1mA ≥ 470V, D ≥ ø10mm), electrically connected in series by means such as twist and soldering, staking, welding etc.
  - 5): UL Standard UL 1414 File No. E89615
  - 6): UL Standard UL 1449 File No. E318314
  - 7): UL Standard UL497B File No. E175280 DC spark-over voltage is described as break down voltage in the UL report.
  - 8): CSA Standard C22.2 No.1 File No. CA111411
  - 9): DSA has received recognition to EN60065, EN60950-1 through TÜV. Report No. J9851289(DSA-752MA), J9251508(除DSA-752MA以外的品种)。
- ※: 可提供U10T型 U10T type can be provided

DB60是采用微隙方式的放电管型电源用浪涌吸收器。引脚间距仅为5mm，结构小巧，贴装面积小。

The DB60 are designed specifically for power supplies using microgap technology to discharge surges.

With a 5mm pitch and a small body size, the part takes up very little space on the board.

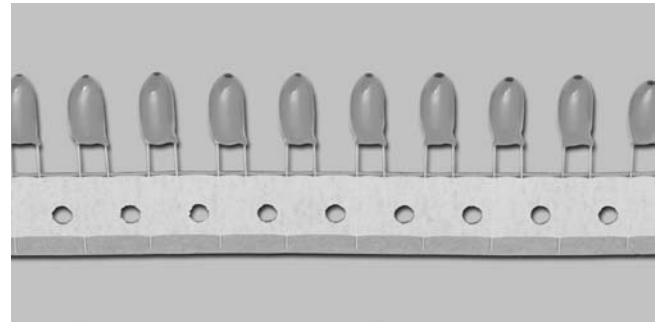
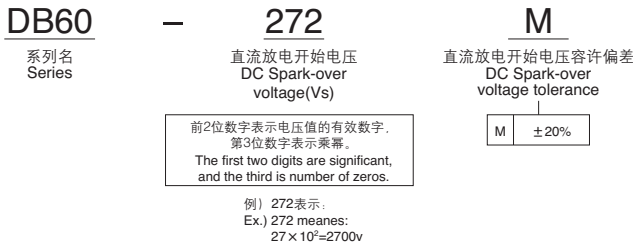
### 特点

- 引脚间距为5mm的径向带带形状，适合自动插装。
- 采用微隙方式，具有优异的浪涌响应效果。
- 100MΩ以上的高绝缘阻抗特性。
- DB60系列可在各种电源电路中与压敏电阻组合使用。

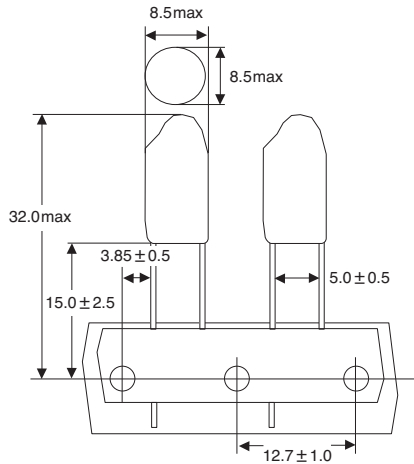
### Features

- The 5mm pitch; radial taped parts can be mounted using automatic insertion equipment.
- Superior surge response characteristics due to microgap technology.
- High insulation resistance of over 100MΩ.
- DB60 series combined with varistor can be used as surge-protecting elements in power supplies.

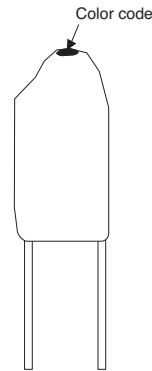
### 型号构成 Part number system



### 形状·尺寸 Dimensions



### 标记 Marking



颜色代码 Color code	型 号 Part No.
黑 Black	
褐 Brown	
红 Red	DB60-272M
橙 Orange	
黄 Yellow	
绿 Green	DB60-302M
蓝 Blue	DB60-362M
紫 Purple	DB60-452M
灰 Gray	
白 White	

### 特性 Characteristics

型 号 Part No.	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	AC耐电压 AC Withstanding Voltage	UL规格认证产品 UL recognized		EN规格认证产品 EN recognized
								4) UL1414	5) UL1449	6) EN60065 EN60950-1
DB60-272M	2,700V (2,160~3,240)	100MΩ min.	DC500V	1pF max.	8/20μsec. 1500A	8/20μsec. 100A 200times	AC1,000V-1min. AC1,200V-3sec.	○1)	○2)	-
DB60-302M	3,000V (2,400~3,600)		DC1000V				AC1,500V-1min.	○1)	○2)	○3)
DB60-362M	3,600V (2,880~4,320)		AC1,800V-3sec.				○1)	○2)	○3)	
DB60-452M	4,500V (3,600~5,400)		AC2,000V-1min.				○1)	-	○3)	

- 1): 与压敏电阻 (AC125V : V1mA ≥ 270V, 8 Joule Min at 2ms. AC250V : V1mA ≥ 470V, 8 Joule Min at 2ms) 电气串接 (导线绕焊、压接、焊接等) 即可被认证。  
Approved if used together with a varistor (AC125V : V1mA ≥ 270V, 8 Joule Min at 2ms. AC250V : V1mA ≥ 470V, 8 Joule Min at 2ms), electrically connected in series by means such as twist and soldering, staking, welding etc.
- 2): 与压敏电阻 (AC125V : V1mA ≥ 270V, D ≥ 5mm. AC250V : V1mA ≥ 470V, D ≥ 5mm) 电气串接 (导线绕焊、压接、焊接等) 即可被认证。  
Approved if used together with a varistor (AC125V : V1mA ≥ 270V, D ≥ 5mm. AC250V : V1mA ≥ 470V, D ≥ 5mm), electrically connected in series by means such as twist and soldering, staking, welding etc.
- 3): 与压敏电阻 (V1mA ≥ 470V, D ≥ 5mm) 电气串接 (导线绕焊、压接、焊接等) 即可被认证。  
Approved if used together with a varistor (V1mA ≥ 470V, D ≥ 5mm), electrically connected in series by means such as twist and soldering, staking, welding etc.
- 4): UL Standard UL1414 File No.E89615
- 5): UL Standard UL1449 File No.E318314
- 6): DB60 has received recognition to EN60065, EN60950-1 through TÜV. Report No.J50164463



DSAHR

■特点

●用于需要较大浪涌耐量的电路的防浪涌。

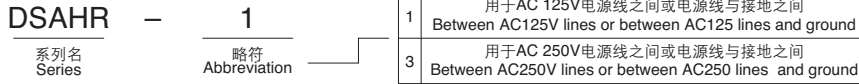
DSAHR

■Features

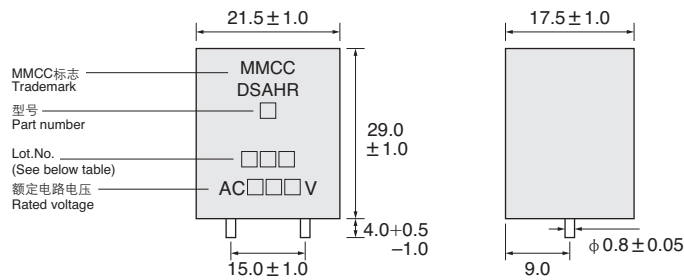
●Used to protect power supplies.



■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
AC125V	DSAHR-1	500V(400~600)	100MΩmin	DC100V	5pF max.	5000A	8/20μsec. 100A 300times
AC250V	DSAHR-3	800V(640~960)		DC250V			

■DSAZR, DSANR, DSAHR  
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: 生产年份的最后一位  
Lot No. second character:manufactured year(Last one digit)

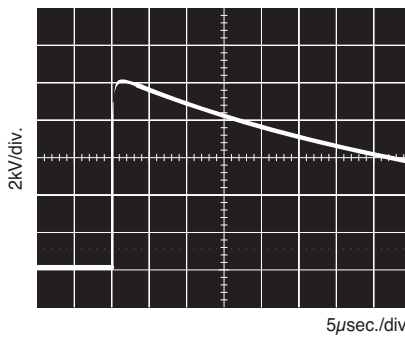
批号左起第3个字符: 生产月份(参见下表)  
Lot No. third character:manufactuerd month(See table below)

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

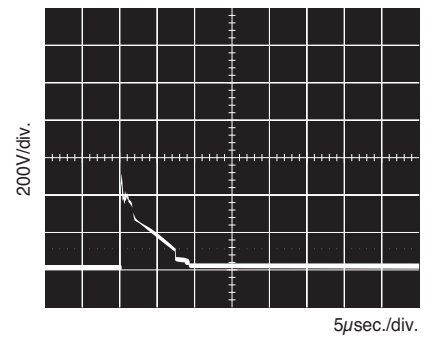
例: E5D 1995年4月生产  
Example: E5D manufactuerd April, 1995

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

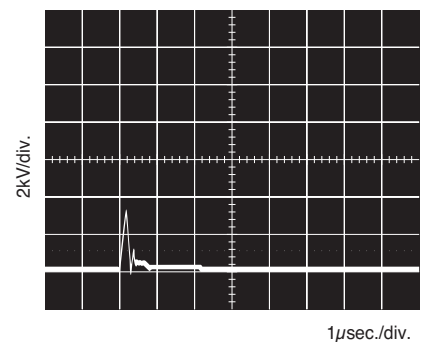
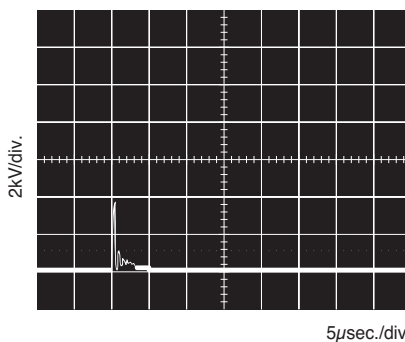
浪涌原波形 Original waveform  
1.2/50μsec. 10kV



DSA-301LA 响应波形 Response waveform



DSA-242MA 响应波形 Response waveform



DSANR

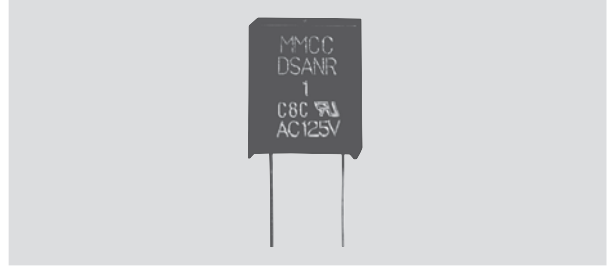
■特点

- 可在各种电源电路中使用。
- 部分型号已获得UL、TÜV认证。

DSANR

■Features

- Used to protect power supplies.
- Some models are recognized by UL, TÜV.

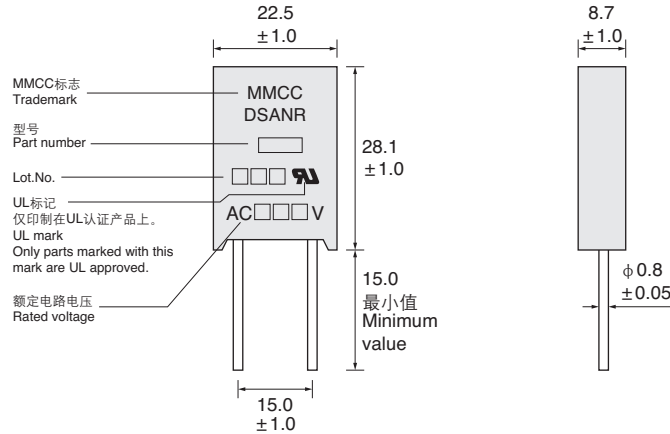


■型号构成 Part number system



1	用于AC125V电源线之间 Between AC125V lines	4	用于AC125V电源线与接地之间 (用于AC1200V绝缘耐压试验) Between AC125V lines and ground (For AC 1200V withstanding voltage test)	6 A	用于AC250V电源线与接地之间 (用于AC1800V绝缘耐压试验) Between AC250V lines and ground (For AC 1800V withstanding voltage test)	10 B	用于AC250V电源线与接地之间 (用于AC2000V绝缘耐压试验) Between AC250V lines and ground (For AC 2000V withstanding voltage test)	(UL)	UL认证产品 UL Recognized
2	用于AC125V电源线与接地之间 Between AC125V lines and ground							无 None	非UL 认证产品 UL not Recognized
3	用于AC250V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AC250V电源线与接地之间 (用于AC1500V绝缘耐压试验) Between AC250V lines and ground (For AC 1500V withstanding voltage test)	9	用于AC250V电源线与接地之间 (用于AC2000V绝缘耐压试验) Between AC250V lines and ground (For AC 2000V withstanding voltage test)				

■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 1kHz-6V max. Electrostatic capacitance 1kHz-6V max. C	浪涌耐量 8/20μsec. Surge current capacity 8/20μsec.	浪涌寿命 Surge life test.	AC耐电压 Withstanding voltage	UL规格认证产品 UL approved		EN认证 EN approved 3)	
			100MΩmin.	2pF max.					1000A	8/20μsec. 100A 500 times		1)
AC125V	DSANR-1	500V(400~600)			100MΩmin.	DC100V	2pF max.	1000A			8/20μsec. 100A 500 times	
	DSANR-2	600V(480~720)	DC250V	-		-			○	-		
	DSANR-2A	800V(640~960)	DC500V	-		-			-	-		
	DSANR-2B	1,100V(880~1,320)		-		-			-	-		
	DSANR-4	2,400V(1,920~2,880)		AC1,000V-1min. AC1,200V-3sec.		○			-	-		-
	DSANR-6	3,600V(2,880~4,320)		AC1,800V-3sec.		-			-	-		-
AC250V	DSANR-3	800V(640~960)	DC250V	-	-	○	-					
	DSANR-3A	1,400V(1,120~1,680)	DC500V	-	-	-	-					
	DSANR-5	3,000V(2,400~3,600)	DC500V	AC1,500V-1min.	○	-	○					
	DSANR-6A	3,600V(2,880~4,320)		AC1,800V-3sec.	-	-	○					
	DSANR-9	4,000V(3,200~4,800)		AC2,000V-1min.	-	-	○					
	DSANR-10B	4,500V(3,600~5,400)		AC2,000V-1min.	-	-	○					

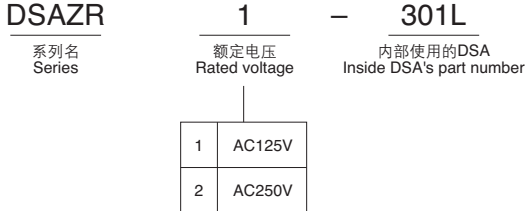
1): UL Standard UL 1414 File No. E89615  
2): UL Standard UL 1449 File No. E318314  
3): DSANR has received recognition to EN60065, EN60950-1 through TÜV. Report No. J9251508

DSAZR

■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防浪涌。
- 部分型号已获得UL、CSA、TÜV认证。

■型号构成 Part number system



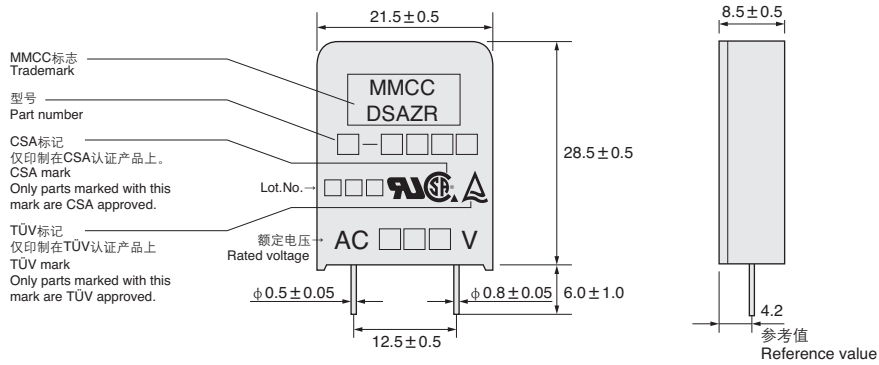
DSAZR

■Features

- Used to protect power supplies.
- Excellent for protecting TV-tuner circuits.
- Some models are recognized by UL, CSA and TÜV.



■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. C	浪涌耐量 Surge current capacity 8/20µsec.	浪涌寿命 Surge life test.	AC耐电压 Withstanding voltage	UL规格认证产品 UL recognized		CSA规格 认证产品 CSA approved 3)	EN认证 EN approved 4)	
								1) UL1414	2) UL1449			
AC125V	DSAZR1-301L	500V(400~600)	100MΩmin.	DC100V	2pF max.	1000A	8/20µsec. 100A 300 times	-	-	○	-	-
	DSAZR1-501M	600V(480~720)		DC250V				-	-	○	-	-
	DSAZR1-102M	1,100V(880~1,320)		DC500V				-	-	-	-	-
	DSAZR1-242M	2,400V(1,920~2,880)						AC1,000V-1min. AC1,200V-3sec.	○	○	○	-
	DSAZR1-282M	2,800V(2,240~3,360)						AC1,250V-3sec.	○	○	○	-
	DSAZR1-302M	3,000V(2,400~3,600)						AC1,500V-1min.	○	○	○	-
	DSAZR1-362M	3,600V(2,880~4,320)						AC1,800V-3sec.	○	○	○	-
	DSAZR1-402M	4,000V(3,200~4,800)						AC2,000V-1min.	○	○	○	-
DSAZR1-452M	4,500V(3,600~5,400)	DC1000V	○	-	○	-						
AC250V	DSAZR2-501M	800V(640~960)	DC250V	-	-	○	-	-				
	DSAZR2-102M	1,400V(1,120~1,680)	DC500V	-	-	-	-	-				
	DSAZR2-242M	2,400V(1,920~2,880)		AC1,000V-1min. AC1,200V-3sec.	○	○	-	-				
	DSAZR2-302M	3,000V(2,400~3,600)		AC1,500V-1min.	○	○	○	○				
	DSAZR2-362M	3,600V(2,880~4,320)		AC1,800V-3sec.	○	○	○	○				
	DSAZR2-402M	4,000V(3,200~4,800)		AC2,000V-1min.	○	○	○	○				
	DSAZR2-452M	4,500V(3,600~5,400)		DC1000V	○	-	○	○				

1): UL Standard UL 1414 File No. E89615  
 2): UL Standard UL 1449 File No. E318314  
 3): CSA Standard C22.2 No. 1 File No. CA87070  
 4): DSAZR has received recognition to EN60065, EN60950-1 through TÜV. Report No. J9251508

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(8/20μsec.)，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

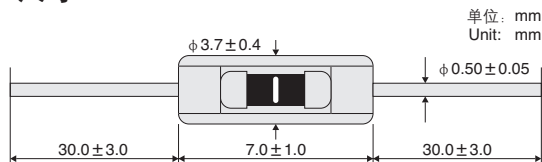
### ■特点

- 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100MΩ以上的高绝缘阻抗特性。

### ■型号构成 Part number system

<b>DE37</b>	<b>—</b>	<b>401</b>	<b>—</b>	<b>W</b>	<b>—</b>	<b>S</b>	<b>—</b>	<b>00</b>	<b>—</b>	<b>B</b>
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		编带尺寸 Taping dimensions		包装形式 Packing form
		前2位数字表示电压值的有效数字。 第3位数字表示乘数。 The first two digits are significant, and the third is number of zeros.  例) 401表示: 40 × 10 <sup>1</sup> = 400V Ex.) 401 means: 40 × 10 <sup>1</sup> = 400V		L ±15% M ±20% W +20% -15%		A 轴向(卧式)编带 Axial taping D 径向(立式)编带 Radial taping S 无编带 No taping		单位: mm Unit:mm 记号 Symbol 04 径向(立式)编带 Radial taping 12 26 10 22 52 10 00 无编带 No taping		B 散装 Bulk pack F 扁平带装 Flat pack taping

### ■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.	浪涌耐量 Surge current capacity 8/20μsec.	寿命测试 Surge life test	AC耐电压 Withstanding Voltage	UL规格认证产品 UL recognized			EN规格认证产品 EN recognized	
								UL 497B 5)	UL 1414 6)	UL 1449 7)	EN60065 8) EN60950-1	
DE37-301L	300V (255~345)	100MΩ2min.	DC 100V	1pF max.	1500A (8/20μsec.)	8/20 μsec. 100A 300times	AC1,000V-1min. AC1,200V-3sec.	○				
DE37-351M	350V (280~420)		DC 250V					○				
DE37-401W	400V (340~480)							○				
DE37-501M	500V (400~600)							○				
DE37-272M	2,700V (2,160~3,240)					DC 500V	8/20 μsec. 100A 200times	AC1,500V-1min. AC1,800V-3sec.	—	○ 1)	○ 3)	
DE37-302M	3,000V (2,400~3,600)		—						○ 1)	○ 3)	○ 4)	
DE37-362M	3,600V (2,880~4,320)		—						○ 1)	○ 3)	○ 4)	
DE37-452M	4,500V (3,600~5,400)		DC 1000V						—	○ 2)	—	○ 4)

- 1): 若与压敏电阻(AC125V : V1mA ≥ 270V, 8 Joule Min at 2ms, AC250V : V1mA ≥ 470V, 8 Joule Min at 2ms)电气串接(导线绕焊、压接、焊接等)即被认可。  
Approved if used together with a varistor (AC125V : V1mA ≥ 270V, 8 Joule Min at 2ms, AC250V : V1mA ≥ 470V, 8 Joule Min at 2ms), electrically connected in series by means such as twist and soldering, staking, welding etc.
- 2): 若与压敏电阻(V1mA ≥ 470V, 8 Joule Min at 2ms)电气串接(导线绕焊、压接、焊接等)即被认可。  
Approved if used together with a varistor (V1mA ≥ 470V, 8 Joule Min at 2ms), electrically connected in series by means such as twist and soldering, staking, welding etc.
- 3): 若与压敏电阻(AC125V : V1mA ≥ 270V, D ≥ ø5mm, AC250V : V1mA ≥ 470V, D ≥ ø5mm)电气串接(导线绕焊、压接、焊接等)即被认可。  
Approved if used together with a varistor (AC125V : V1mA ≥ 270V, D ≥ ø5mm, AC250V : V1mA ≥ 470V, D ≥ ø5mm), electrically connected in series by means such as twist and soldering, staking, welding etc.
- 4): 若与压敏电阻(V1mA ≥ 470V, D ≥ ø5mm)电气串接(导线绕焊、压接、焊接等)即被认可。  
Approved if used together with a varistor (V1mA ≥ 470V, D ≥ ø5mm), electrically connected in series by means such as twist and soldering, staking, welding etc.
- 5): UL Standard UL 497B File No. E175280 DC spark-over voltage is described as break down voltage in the UL report.
- 6): UL Standard UL 1414 File No. E89615
- 7): UL Standard UL 1449 File No. E70785 or E318314
- 8): DE37 has received recognition to EN60065, EN60950-1 through TÜV. Report No.J50164439

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

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

### ■Basic Conditions for ITU-T K.20

- Surge Test: 10/700μsec, 1.5kV/4kV (25Ω), 5 times.
- AC Induced Test : AC600V (600Ω), 1sec., 5 times.
- AC Cross Test: AC230V(10~1000Ω), 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。

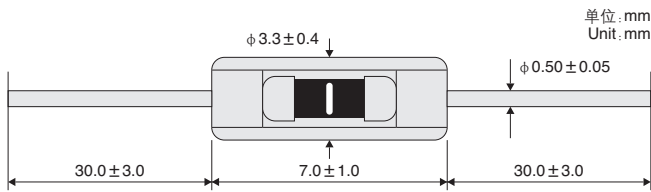
■Features

- Surge protection for telephone lines.(telephone, modem, facsimile etc.)
- Surge protection for telecommunication lines.(computer etc.)
- Some models are recognized by UL.

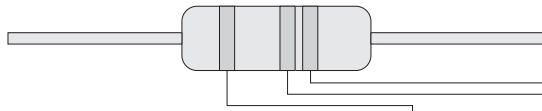
■型号构成 Part number system

<b>DSS</b> 系列名 Series	<b>301</b> 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位数字表示零。 The first two digits are significant, and the third is number of zeros.  例) 301表示: 30 × 10 <sup>1</sup> = 300v Ex.) 301 means: 30 × 10 <sup>1</sup> = 300v	<b>L</b> 直流放电开始电压容许偏差 DC Spark-over voltage tolerance  L ±15% M ±20%	<b>S</b> 编带形式 Taping form  A 轴向(卧式)编带 Axial taping C 径向(立式)编带 Radial taping S 无编带 No taping	<b>00</b> 编带尺寸 Taping dimensions  单位: mm Unit:mm 记号 Symbol 编带内侧宽度 Taping width (径向编带) (Radial taping) 间距 Pitch 04 26 12.7 12 26 10 22 52 10 00 无编带 No taping	<b>B</b> 包装形式 Packing form  B 散装 Bulk pack F 扁平带装 Flat pack taping R 卷盘带装 Reel taping
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■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	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	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

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 recognized
DSS-201M	200V(160~240)	100MΩmin.	DC 100V	1pF max.	500A	DOC单循环1) DOC 1cycle	UL 497B 2)
DSS-301L	300V(255~345)		DC 250V				○
DSS-351M	350V(280~420)		○				
DSS-401M	400V(320~480)		○				
DSS-601M	600V(480~720)	○					

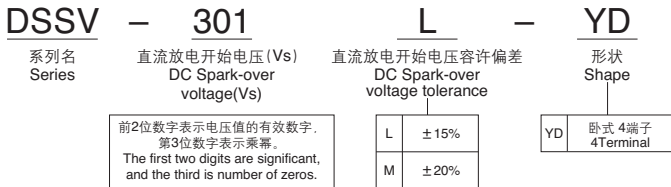
1). DOC 1cycle 10/1000μsec. 1KV-12times, 100/1000μsec. 1KV-12times respectively.  
2). UL Standard UL 497B File No. E175280 DC spark-over voltage is described as break down voltage in the UL report.

DSSV

■特点

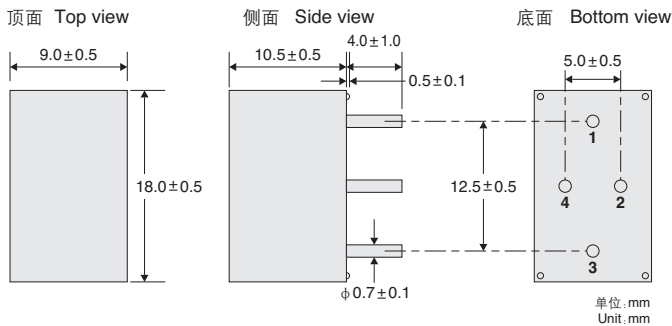
- 用于电话机、调制解调器、传真机等电话线路连接设备的防浪涌以及防过电压 (UL1459、CSA-22.2 No.225-M90)。

■型号构成 Part number system



■形状・尺寸 Dimensions

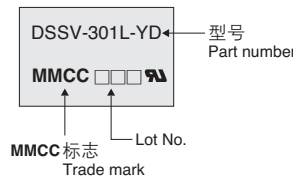
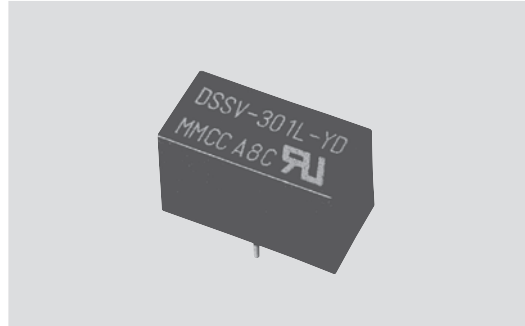
DSSV-YD Type



DSSV

■Features

- Protects telephone line equipment (telephone, modem, facsimile etc.) against surge and overvoltage (UL1459, CSA-22.2 No. 225-M90).



■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 8/20μsec.	浪涌寿命 Surge life test	UL规格认证产品 UL recognized
		100MΩmin.	DC 100V DC 250V				UL 497A 3)
DSSV-201M-YD	200V(160~240)	100MΩmin.	DC 100V	2pF max.	400A	FCC循环1) FCC cycle 1)	○
DSSV-301L-YD	300V(255~345)		DC 250V			DOC单循环2) DOC 1cycle 2)	○
DSSV-401M-YD	400V(320~480)						

1). FCC10/560μsec. 100A ±3times, 10/160μsec. 200A ±3times  
2). DOC 1cycle 10/1000μsec. 1KV-12times, 100/1000μsec. 1KV-12times respectively.  
3). UL Standard UL 497A File No. E131010

■DSSV型过电压截止特性 Overvoltage cut off properties of DSSV type

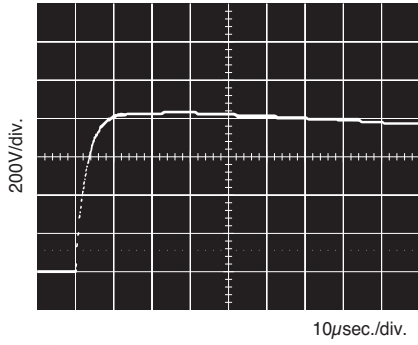
型号 Part number	DSSV-301L-YD, DSSV-401M-YD		
外加条件 Applied conditions	AC600V-40A-1.50sec.	AC600V-7A-5sec.	AC600V-2.2A-30min.
着火率 Rate of ignition n=100	0	0	0

在电话机的安全标准、UL60950、CSA-C22.2 No.225-M90中，有对电话机的通信线路外加上述过电压的试验。对于上述过电压，DSSV系列将快速作出响应，阻断流入通信线路或浪涌吸收器的过电压。

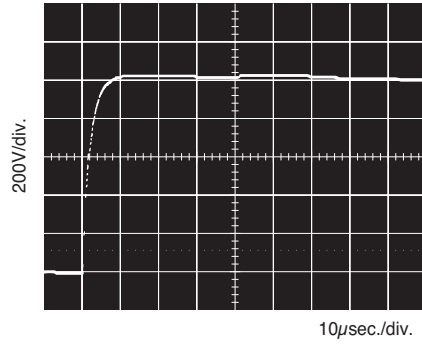
Overvoltage testing is required in both UL60950 and CSA-C22.2 No.225-M90. The DSSV is effective in protecting against these overvoltage conditions by opening the circuit.

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

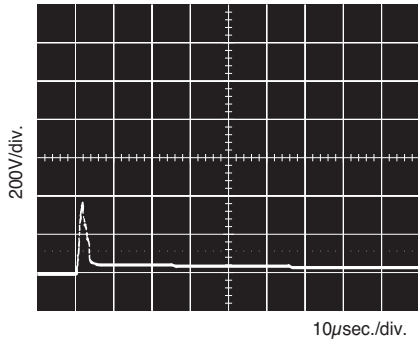
浪涌原波形 Original waveform  
FCC 10/560 $\mu$ sec. 800V



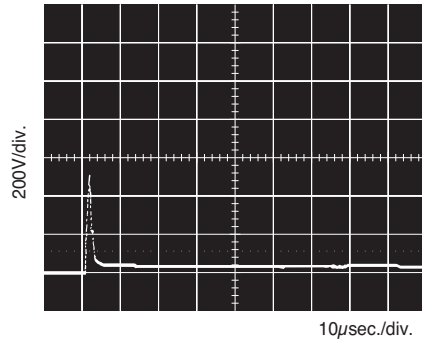
DOC 10/1000 $\mu$ sec. 1000V



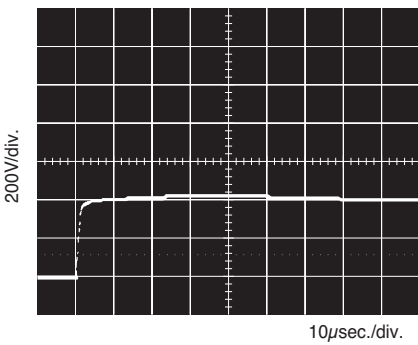
响应波形 Response waveform  
DSS-301L, DSSV-301L-YD  
FCC 10/560 $\mu$ sec. 800V外加



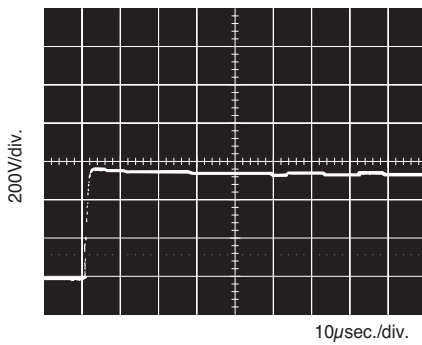
DSS-401L, DSSV-401M-YD  
DOC 10/1000 $\mu$ sec. 1000V外加



压敏电阻 Varistor 270V



压敏电阻 Varistor 390V



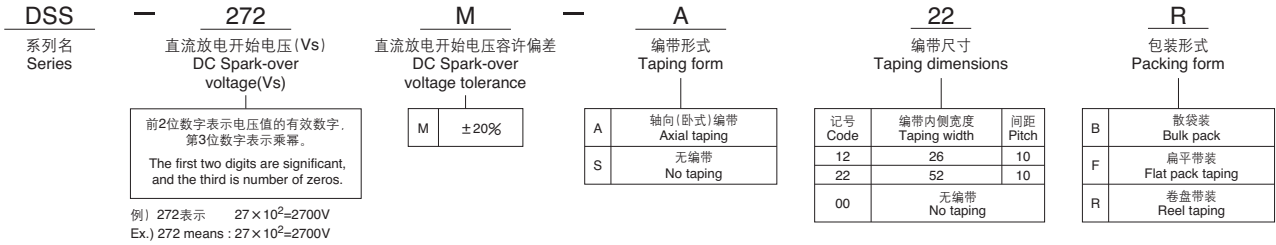
■特点

- 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。
- 无明显暗效应。
- 本系列已获得UL1414、UL1449、CSA、TÜV认证。

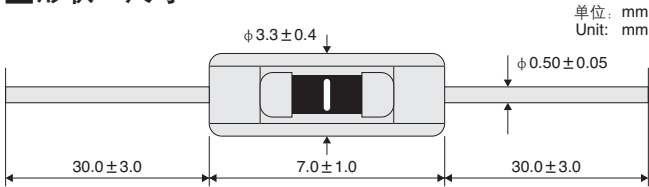
■Features

- 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 UL 1414, UL1449, CSA and TÜV.

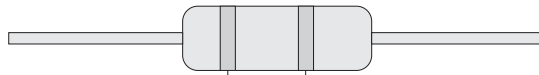
■型号构成 Part number system



■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		0
茶	Brown		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

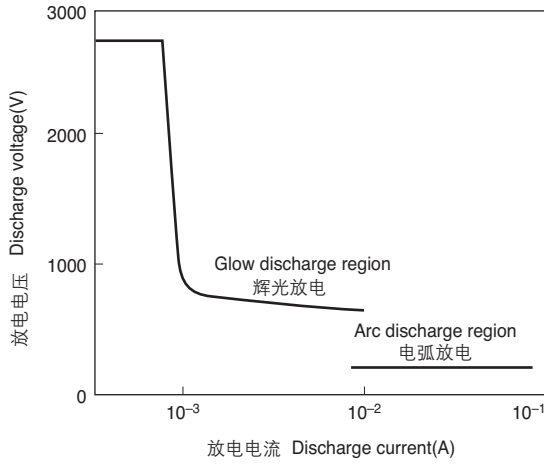
型号 Part number	直流放电开始电压 DC spark-over voltage Vs(V)	绝缘阻抗 Insulation resistance IR		静电容量 Electrostatic capacitance 1kHz-6V max.	浪涌耐量 Surge current capacity	浪涌寿命 Surge life test	AC耐电压 AC withstanding voltage	UL规格认证产品 UL approved		CSA规格 CSA approved (7)	EN认证 EN approved (8)
		100MΩmin.	DC500V					5) UL1414	6) UL1449		
DSS-272M	2,700V(2,160~3,240)	100MΩmin.	DC500V	1pF max.	8/20μsec-500A	8/20μsec50A 300次 300 times	AC1,200V-3sec. AC1,000V-1min.	○1) ○2)	○3)	-	
DSS-302M	3,000V(2,400~3,600)						AC1,500V-1min.	○1) ○2)	○3)	○4)	

- 1) 与UL认证压敏电阻(AC125V : V1mA ≥ 270V, 8 Joule Min at 2ms, AC250V : V1mA ≥ 470V, 8 Joule Min at 2ms) 电气串接(导线绕焊、压接、焊接等)即可被认证。  
Approved if used together with an UL approved varistor (AC125V : V1mA ≥ 270V, 8 Joule Min at 2ms, AC250V : V1mA ≥ 470V, 8 Joule Min at 2ms), electrically connected in series by means such as twist and soldering, staking, welding etc.
- 2) 与UL认证压敏电阻(V1mA ≥ 270V, D ≥ 0.5mm) 电气串接(导线绕焊、压接、焊接等)即可被认证。  
Approved if used together with an UL approved varistor (V1mA ≥ 270V, D ≥ 0.5mm), electrically connected in series by means such as twist and soldering, staking, welding etc.
- 3) 与压敏电阻(AC125V : V1mA ≥ 270V, D ≥ 0.5mm. AC250V : V1mA ≥ 470V, D ≥ 0.5mm) 电气串接(导线绕焊、压接、焊接等)即可被认证。  
Approved if used together with a varistor (AC125V : V1mA ≥ 270V, D ≥ 0.5mm. AC250V : V1mA ≥ 470V, D ≥ 0.5mm), electrically connected in series by means such as twist and soldering, staking, welding etc.
- 4) 与压敏电阻(V1mA ≥ 470V, D ≥ 0.10mm) 电气串接(导线绕焊、压接、焊接等)即可被认证。  
Approved if used together with a varistor (V1mA ≥ 470V, D ≥ 0.10mm), electrically connected in series by means such as twist and soldering, staking, welding etc.
- 5) UL Standard UL1414 File No.E89615
- 6) UL Standard UL1449 File No.E70785 or E318314
- 7) CSA Standard C22.2 No1 File No. CA111411
- 8) DSS-302M has received recognition to EN60065, EN60950-1 through TÜV. Report No J9750615.

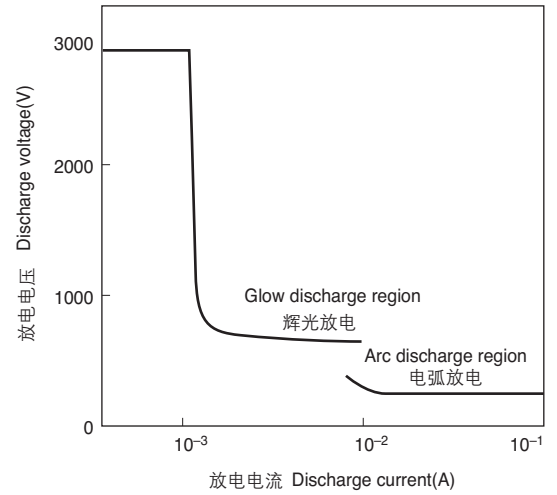


■ V—I特性(参考值) Characteristics (Reference)

DSS-272M

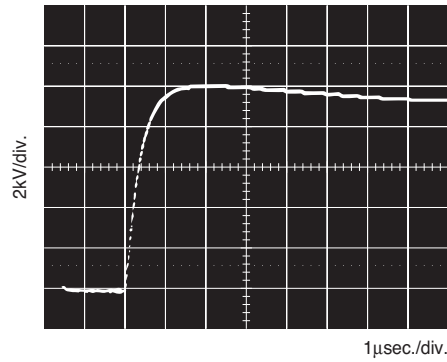


DSS-302M

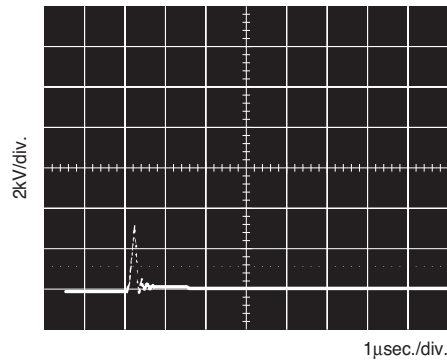


■ 浪涌响应特性(参考值) Surge Response characteristics (Reference)

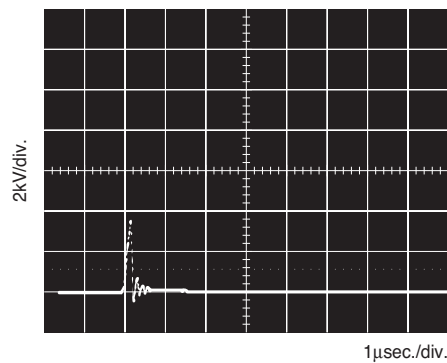
浪涌原波形  
Original waveform  
1.2/50μsec.10kV



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



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



CDA70是芯片型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形状的小型低背芯片，但是，具备8/20 μs-2,000A型的抗冲击破坏力。

CDA70 is a chip type surge absorber for protecting communication networks with excellent surge protection characteristics and low capacitance less than 0.6pF. Even with its small package design, it is easily able to withstand 2,000A (8/20μsec.) surge.

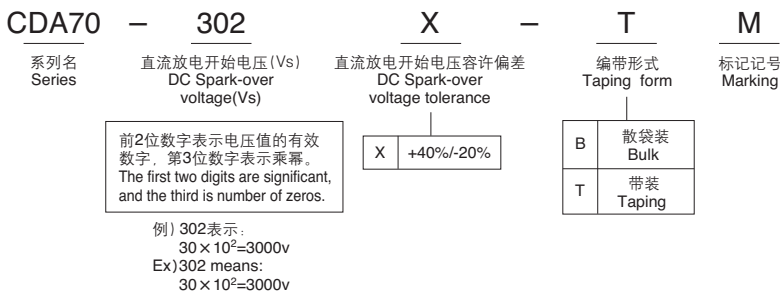
■特点

- 以4032形状的小型芯片应对自动安装
- 应对正流、回流钎焊
- 高质响应性
- 最适用于高频电路使用
- 0.6pF以下的低静电容量
- 超100MΩ以上的强绝缘电阻特性
- 已通过UL1449标准
- RoHS适应品

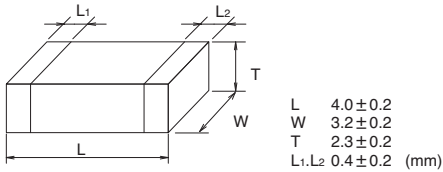
■Features

- Standard small chip package; EIA 1612, height; 2.3 ± 0.2mm using automatic equipment
- Can be used with flow or reflow solder
- Low capacitance of less than 0.6pF means no appreciable attenuation on high-speed, megabit class communication signals.
- Excellent insulation resistance over 100Mohm
- Recognized UL1449
- RoHS directive conformable

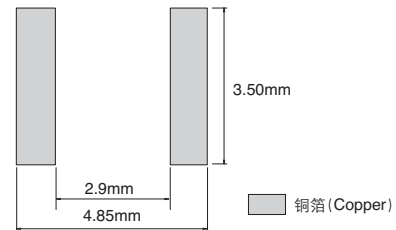
■型号构成 Part number system



■形状・尺寸(mm) Dimensions (mm)



■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	浪涌寿命 Surge life test	AC耐电压 withstanding voltage	UL规格认证产品 UL recognized	EN规格认证产品 EN recognized
		100MΩmin.	DC 500V					UL 1449 1)	EN60065 2) EN60950-1
CDA70-302X	3,000V(2,400~4,200)	100MΩmin.	DC 500V	0.6pF max.	2000A (8/20μsec)	100A 300 times (8/20μsec)	AC1500V-1min.	○	○

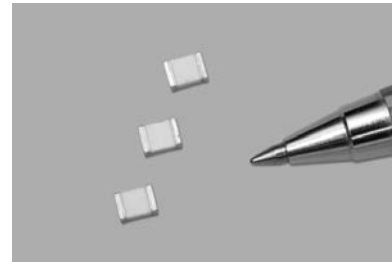
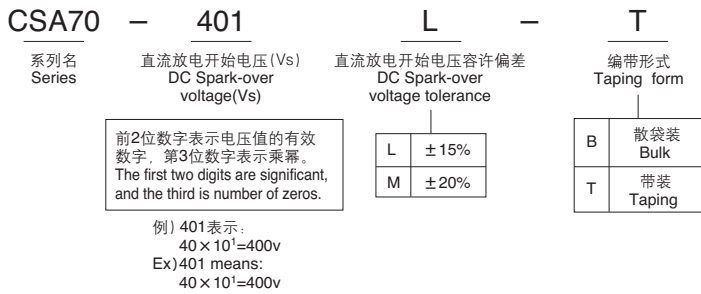
1): UL Standard UL 1449 File No. E318314  
2): CDA 70 has received recognition to EN60065, EN60950-1 through TÜV. Report No.J50164470

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1,500A(8/20 $\mu$ sec.)。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)。

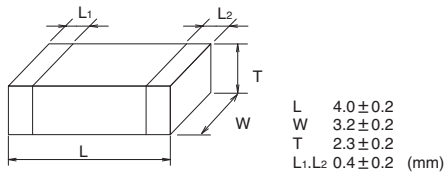
■特点

- 使用4032形状的小型芯片，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，不会阻碍兆级的高速通信信号。
- 100M $\Omega$ 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。

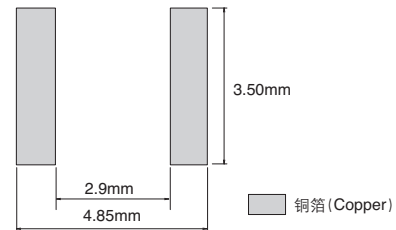
■型号构成 Part number system



■形状・尺寸(mm) Dimensions (mm)



■推荐焊盘布局 Recommended Land Pattern



■特性 Characteristics

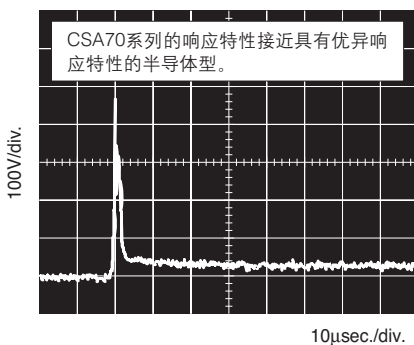
型号 Part number	直流放电开始电压 DC Spark-over voltage Vs	绝缘阻抗 Insulation resistance IR		静电容量 Electrostatic capacitance 1kHz-6V max. C	浪涌耐量 Surge current capacity	浪涌寿命 Surge life test	UL规格认证产品 UL recognized
		100M $\Omega$ min.	DC 100V				0.6pF max.
CSA70-301L	300V(255~345)		DC 250V	○			
CSA70-401L	300V(340~460)		○				
CSA70-601M	300V(480~720)	○					

1): UL Standard UL 497B File No. E175280

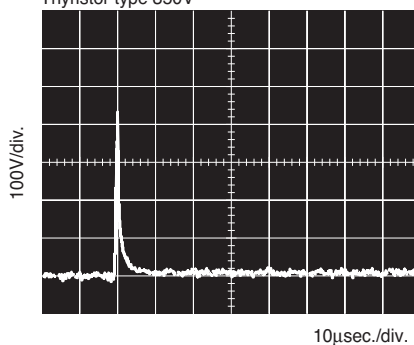
■浪涌响应特性(参考值) Surge Response Characteristics (Reference)

对10/700 $\mu$ sec. 4kV浪涌的响应波形  
Response waveform against 10/700 $\mu$ sec. 4kV

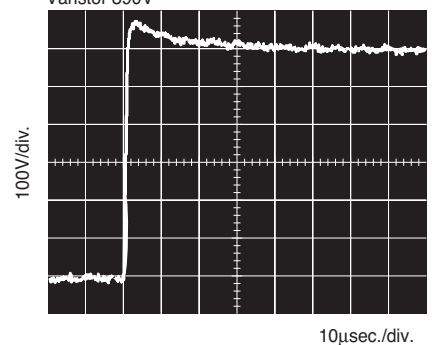
CSA70-401L



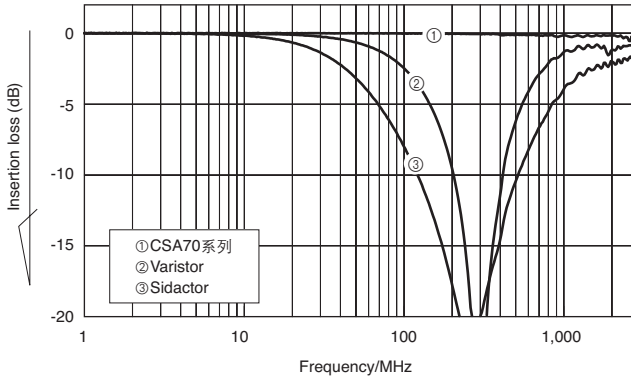
可控硅型  
Thyristor type 350V



压敏电阻  
Varistor 390V



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



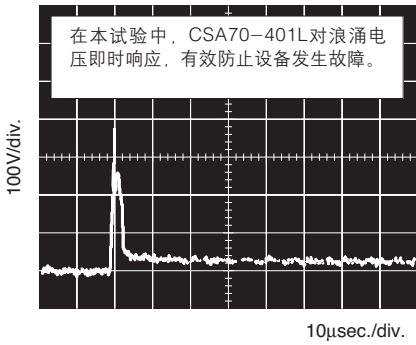
如左图所示, CSA70系列具有0.6pF以下的低静电容量, 因此不会阻碍兆位级的高速通信信号。

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.

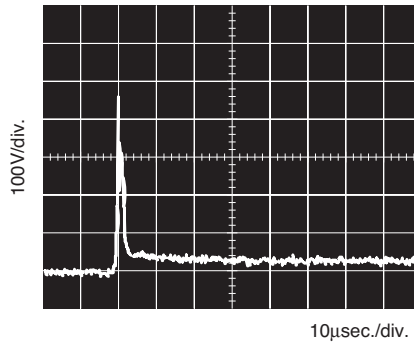
CSA70-401L的ITU-T K.20或K21的基本试验条件(参考)

浪涌试验: 10/700μsec. 1.5kV/4kV (25Ω) ±5次  
Surge Test

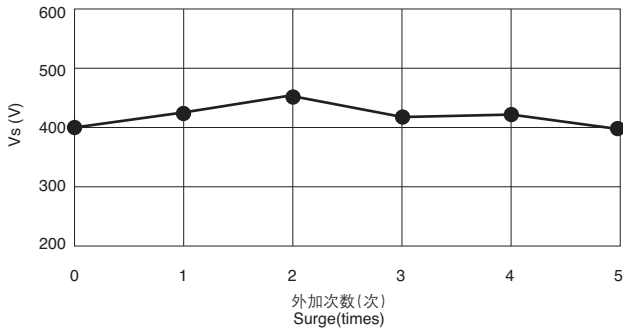
响应波形 Response waveform  
10/700μsec. 1.5kV



响应波形 Response waveform  
10/700μsec. 4kV



AC感应试验: AC600V (600Ω) 1sec. 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 (10~1000Ω) 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的基本试验条件(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92页。 Please refer to page 92 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。

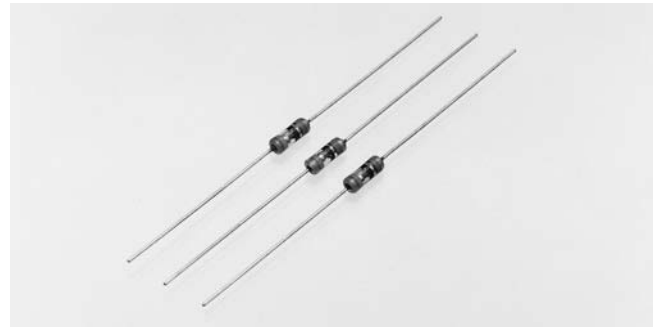
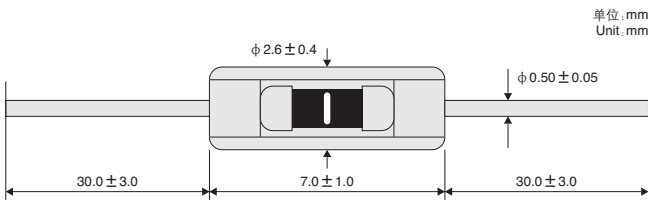
■Features

- 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.

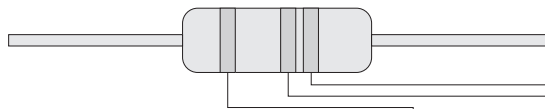
■型号构成 Part number system

<b>DSP</b>	-	<b>301</b>	-	<b>N</b>	-	<b>S</b>	-	<b>00</b>	-	<b>B</b>	
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		编带尺寸 Taping dimensions		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) 301表示: 30 × 10 <sup>1</sup> = 300v Ex.) 301 means: 30 × 10 <sup>1</sup> = 300v		M ± 20% N ± 30%		A 轴向(卧式)编带 Axial taping C 径向(立式)编带 Radial taping S 无编带 No taping		记号 Code 04 11 21 00	编带内倒宽度 Taping width (径向编带) (Radial taping) 26 52 无编带 No taping	间距 Pitch 12.7 5 5	B 散袋装 Bulk pack F 扁平包装 Flat pack taping R 带盘包装 Reel taping

■形状·尺寸 Dimensions



■标记 Marking

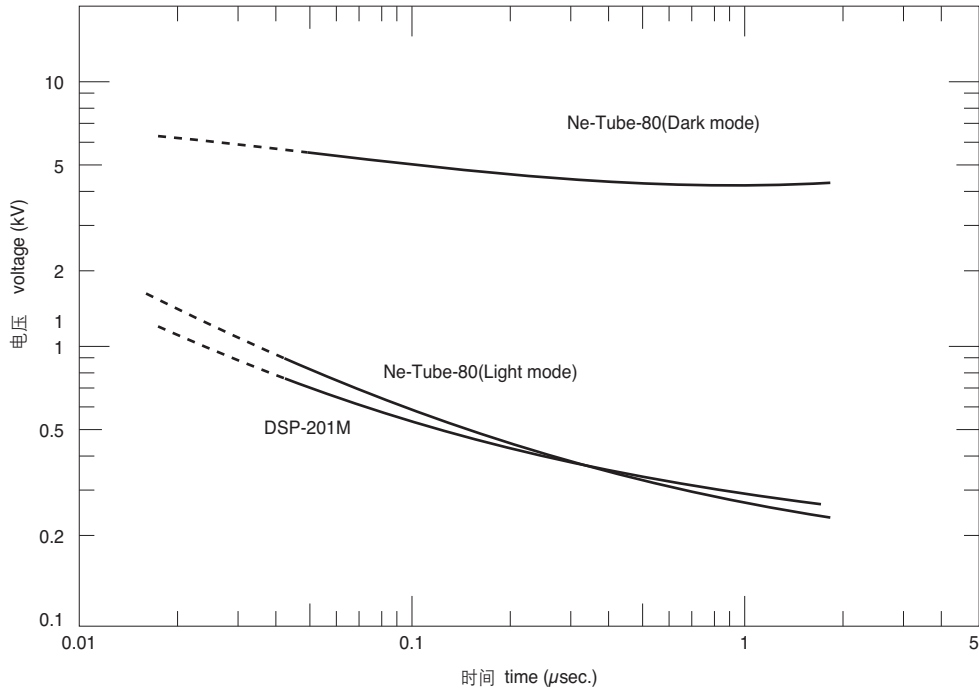


颜色代码 Color code	第一色带 First color band		第二色带 Second color band		第三色带 Third color band	
	型号 Part number	生产批号十位数 The tens digit of product Lot No.	生产批号十位数 The tens digit of product Lot No.	生产批号个位数 The unit digit of product Lot No.	生产批号个位数 The unit digit of product Lot No.	生产批号个位数 The unit digit of product Lot No.
黑 Black		0	0	0	0	0
褐 Brown		1	1	1	1	1
红 Red	201M	2	2	2	2	2
橙 Orange	301N	3	3	3	3	3
黄 Yellow		4	4	4	4	4
绿 Green	501N	5	5	5	5	5
蓝 Blue		6	6	6	6	6
紫 Purple	751N	7	7	7	7	7
灰 Gray		8	8	8	8	8
白 White	141N	9	9	9	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	浪涌寿命 Surge life test
DSP-141N	140V (98 ~ 182)	100MΩmin.	1pF max.	1500pF-0Ω-10kV 200 times
DSP-201M	200V (160 ~ 240)			
DSP-301N	300V (210 ~ 390)			
DSP-501N	500V (350 ~ 650)			
DSP-751N	750V (525 ~ 975)			

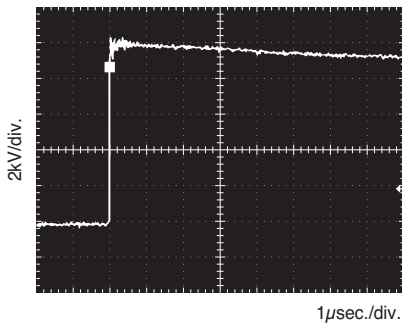
■ V—t特性(参考值) V—t Characteristics (Reference)



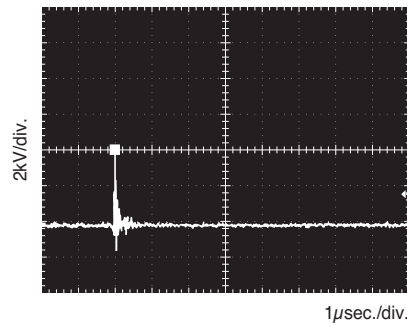
- 表现出快速响应瞬变静电的特性。
- 无明暗效应。
- Rapid response against electrostatic discharge with instantaneous rise.
- No dark effect.

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

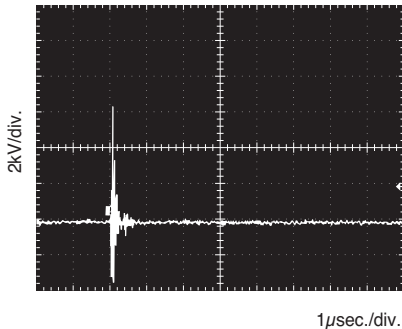
静电原波形 Original waveform  
500pF-500Ω-10kV



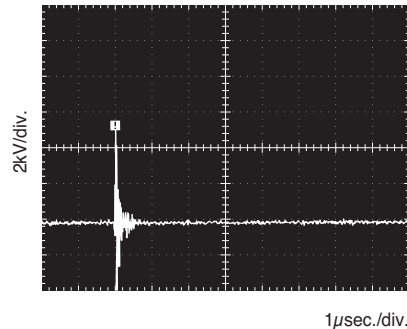
DSP-201M 响应波形(明、暗)  
DSP-201M Response waveform (Light & Dark mode)



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)



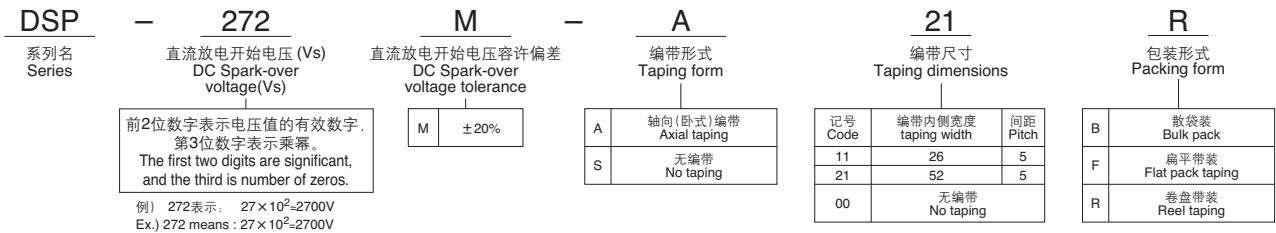
■特点

- 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。

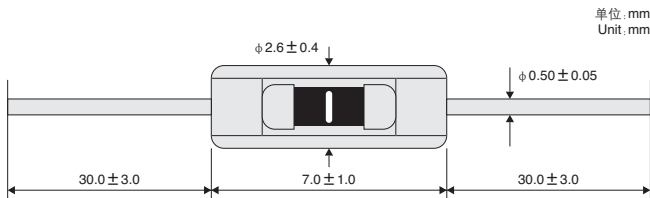
■Features

- 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 (100M Ω min)
- Stable for repeated electrostatic test conditions and environmental fluctuation.
- No polarity.
- No dark effect.

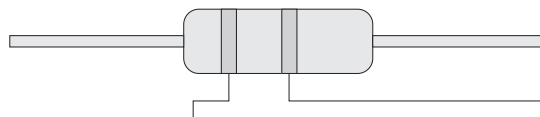
■型号构成 Part number system



■形状·尺寸 Dimensions



■标记 Marking



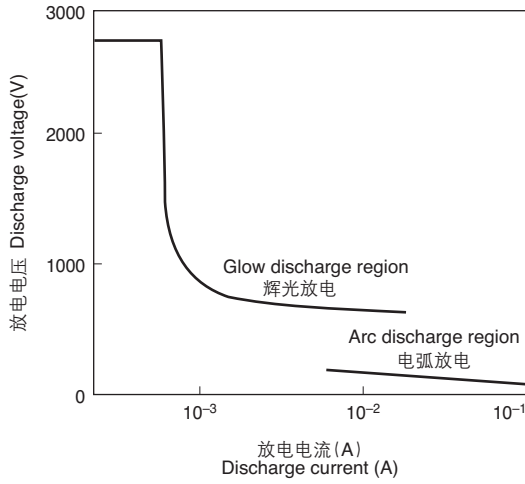
颜色代码 Color code	Color code	第一色带 First color band		第二色带 Second color band	
		型号 Part number		生产批号个位数 The unit digit of lot number	
黑	Black	102M		0	
茶	Brown	152M		1	
红	Red	272M		2	
橙	Orange	302M		3	
黄	Yellow			4	
绿	Green			5	
蓝	Blue			6	
紫	Purple			7	
灰	Gray			8	
白	White			9	

■特性 Characteristics

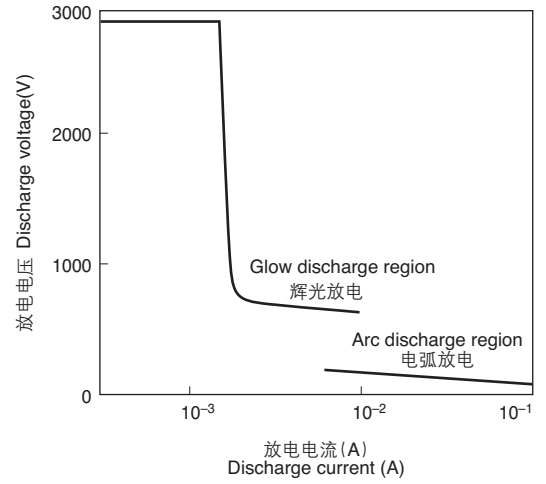
型号 Part number	直流放电开始电压 DC spark-over voltage Vs(V)	绝缘阻抗 Insulation resistance IR		静电容量 Electrostatic capacitance 1kHz-6V max.	浪涌耐量 Surge current capacity	浪涌寿命 Surge life test	AC耐电压 AC withstanding voltage
DSP-102M	1,000V(800~1,200)	100MΩmin.	DC 500V	1pF max.	8/20μsec-300A	1,500pF-0Ω-10kV 200 times	无 (nothing)
DSP-152M	1,500V(1,200~1,800)						无 (nothing)
DSP-272M	2,700V(2,160~3,240)						AC1,000V-1min. AC1,200V-3sec.
DSP-302M	3,000V(2,400~3,600)						AC1,500V-1min.

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

DSP-272M

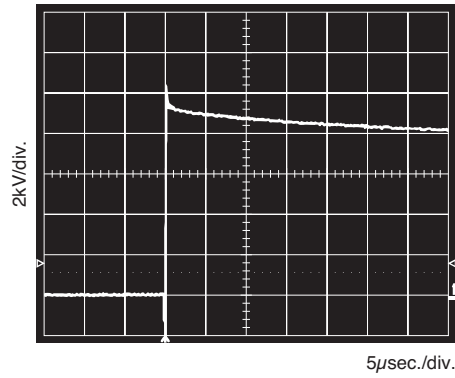


DSP-302M

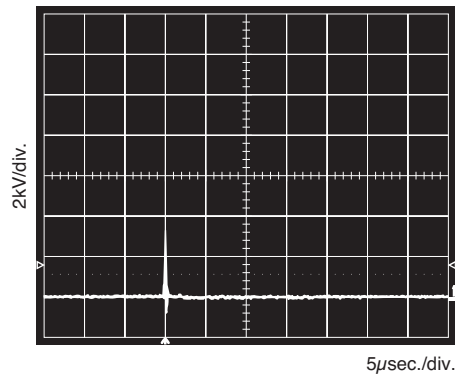


■ 静电响应特性(参考值) Electrostatic response characteristics (Reference)

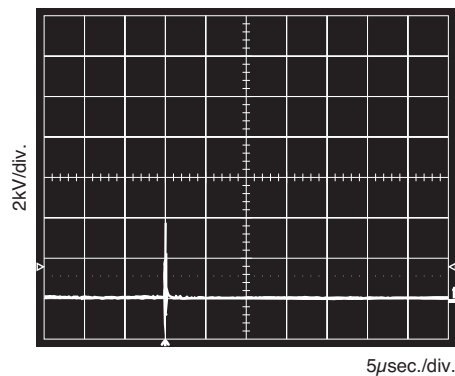
静电原波形 Original waveform  
500pF-500Ω-10kV



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.

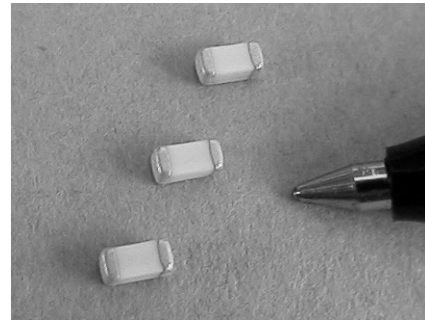
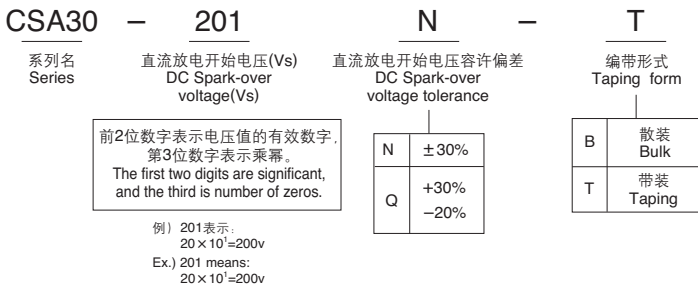
■特点

- 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。

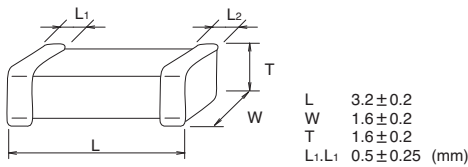
■Features

- 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.

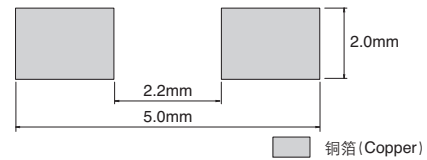
■型号构成 Part number system



■形状・尺寸(mm) Dimensions (mm)



■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)	10MΩmin.	1pF max.	150pF-330Ω-25kV 20 times
CSA30-201N	200V(140~260)			
CSA30-401Q	400V(320~520)			

■关于IEC61000-4-2

- 静电放电扰度试验  
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 is easily able to meet requirements of IEC61000-4-2.

■焊接条件请参见第92页。

Please refer to page 92 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.

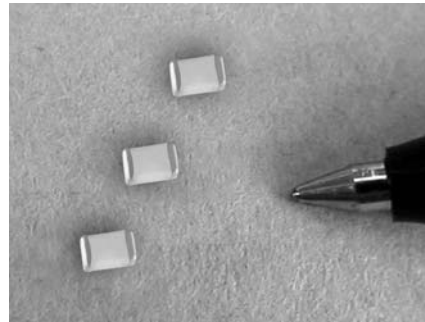
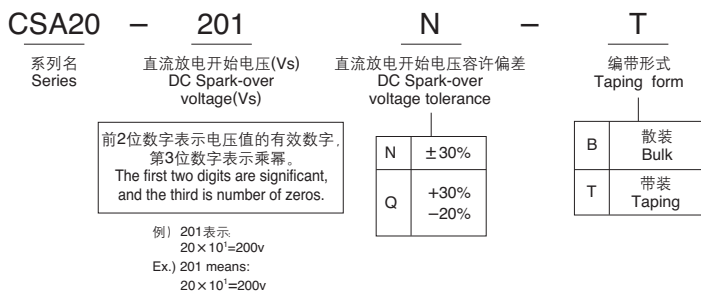
■特点

- 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。

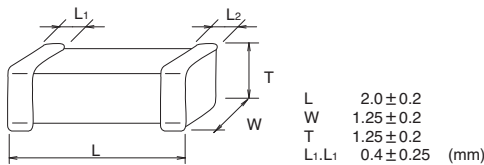
■Features

- 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.

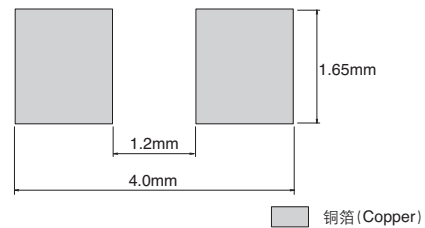
■型号构成 Part number system



■形状・尺寸(mm) Dimensions (mm)



■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)	100MΩmin.	DC 50V	1pF max.	150pF-330Ω-20kV 20 times
CSA20-201N	200V(140~260)		DC 100V		
CSA20-401Q	400V(320~520)		DC 250V		

■关于IEC61000-4-2

- 静电放电扰度试验  
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 is easily able to meet requirements of IEC61000-4-2.

■焊接条件请参见第92页。

Please refer to page 92 for soldering conditions.

CSA10(1608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-15kV,完全符合IEC61000-4-2的要求。

CSA10 (EIA 0603 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.

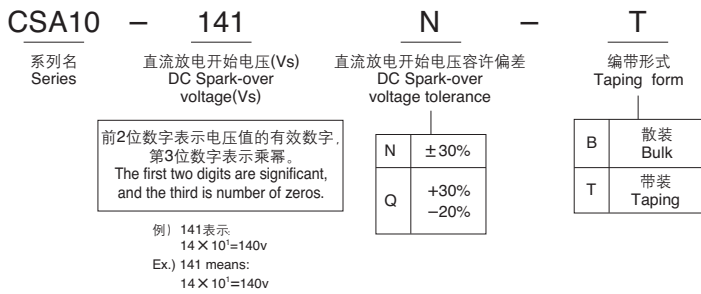
■特点

- 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。

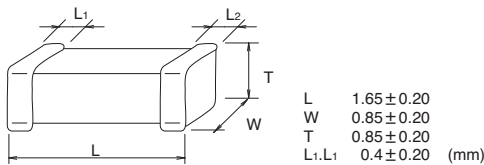
■Features

- 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.

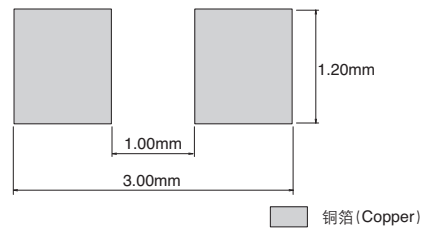
■型号构成 Part number system



■形状・尺寸(mm) Dimensions (mm)



■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)	
CSA10-141N	140V(98~182)	100MΩmin.	DC 50V	1pF max.	150pF-330Ω-15kV 20 times

■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)
- CSA10具有150pF-330Ω-15kV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)
- CSA10 series is easily able to meet requirements of IEC61000-4-2.

■焊接条件请参见第92页。

Please refer to page 92 for soldering conditions.

CSZ30(3216形状)是贴片式车辆ECU防静电用浪涌吸收器。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性和1pF以下的低静电容量。本产品结构小巧,静电浪涌耐受达330pF-2kΩ-25kV,完全符合ISO10605标准。

CSZ30 (EIA 1206 size) is a chip type surge absorber for automotive ECU 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 ISO10605.

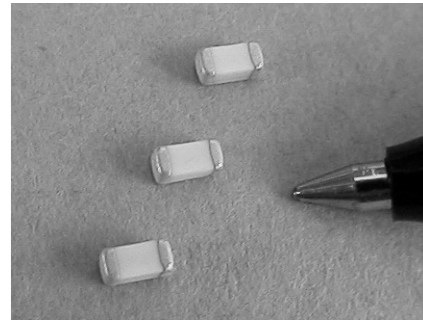
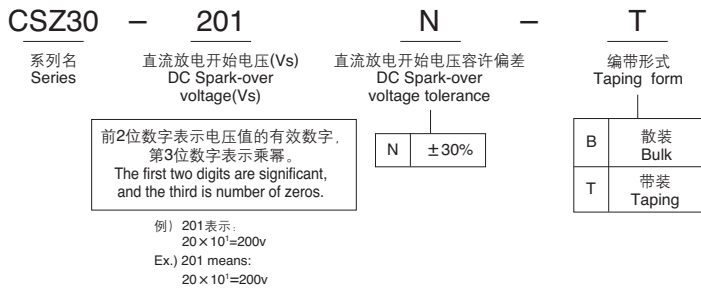
■特点

- 适合高密度表面贴装的防静电用浪涌吸收器。
- 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ISO10605规格。

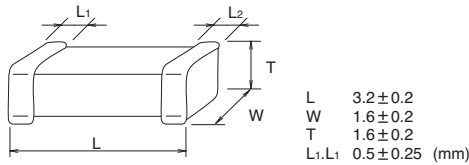
■Features

- 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 ISO10605 standard

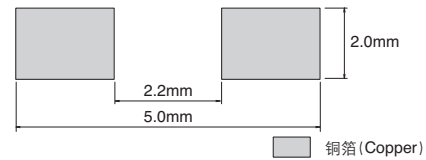
■型号构成 Part number system



■形状・尺寸(mm) Dimensions (mm)



■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 Surge life test
CSZ30-201N	200V(140~260)	10MΩmin.	DC 100V	1pF max.	330pF-2kΩ-25kV ± 10 times

■关于ISO10605

- 路面车辆 静电放电电压试验方法  
330pF-2kΩ-4~8kV (接触放电)  
4~15kV (空气放电)
- CSZ30具有330pF-2kΩ-25kV的静电浪涌耐受量,完全满足上述要求。

■About ISO10605

- Road vehicles-Test methods for electrical disturbances from electrostatic discharge  
330pF-2kΩ-4~8kV (Contact discharge)  
4~15kV (Air discharge)
- CSZ30 series easily able to meet requirements of ISO10605.

■焊接条件请参见第92页。

Please refer to page 92 for soldering conditions.

CSZ20 (2125形状) 是贴片式车辆ECU防静电用浪涌吸收器。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330pF-2kΩ-15kV, 完全符合ISO10605标准。

CSZ20 (EIA 0805 size) is a chip type surge absorber for automotive ECU 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 ISO10605.

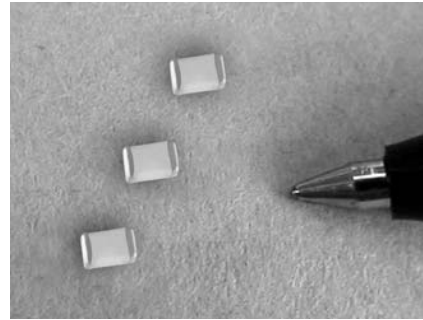
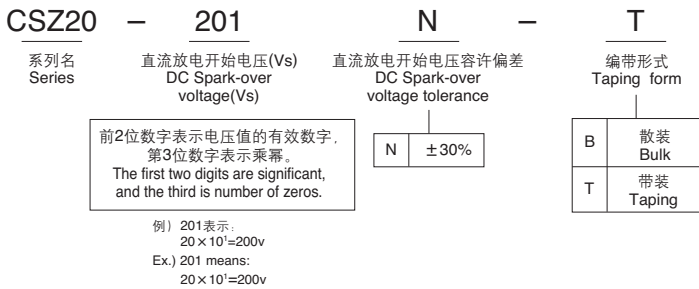
■ **特点**

- 适合高密度表面贴装的防静电用浪涌吸收器。
- 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ISO10605规格。

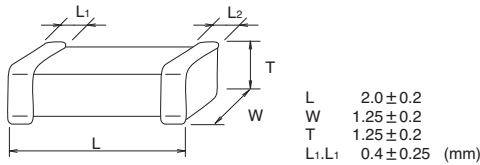
■ **Features**

- 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 ISO10605 standard

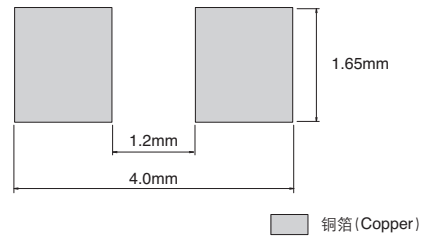
■ **型号构成 Part number system**



■ **形状・尺寸(mm) Dimensions (mm)**



■ **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 Surge life test
CSZ20-201N	200V(140~260)	10MΩmin.	DC 100V	1pF max.	330pF-2kΩ-15kV ± 10 times

■ **关于ISO10605**

- 路面车辆 静电放电扰度试验方法  
330pF-2kΩ-4~8kV (接触放电)  
4~15kV (空气放电)  
CSZ20具有330pF-2kΩ-15kV的静电浪涌耐量, 完全满足上述要求。

■ **About ISO10605**

- Road vehicles-Test methods for electrical disturbances from electrostatic discharge  
330pF-2kΩ-4~8kV (Contact discharge)  
4~15kV (Air discharge)  
CSZ20 series easily able to meet requirements of ISO10605.

■ 焊接条件请参见第92页。

Please refer to page 92 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。

该系列有两种类型：一种是用一台保护种电子设备的桌台插座型和另一种使可安装在控制柜内的通用型。

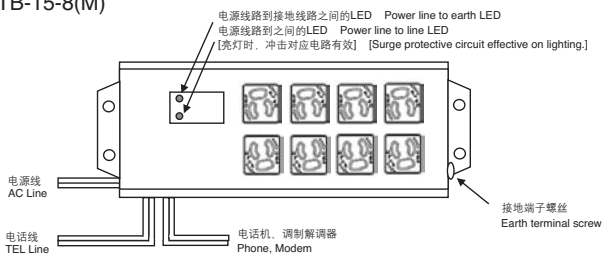
## 特点

- 结构小巧，使用及安装非常简便。
- 可对浪涌作出快速响应，保护设备免遭损坏。
- LTB-15-8(M)符合电源以及电话线路的冲击。
- LTM-125U、250U符合等级(Ⅱ)(JIS C5381-1)的要求。

## 典型用途

- 电脑、调制解调器、传真机、POS系统、自动贩卖机或家用电器产品(LTB-15-8(M))
- NC机床、放电加工机、机械手等(LTM-125U、LTM-250U)。

LTB-15-8(M)



(接线方法)

设备控制盘的输入处有R, S(N), T, E铭牌。LTM-250U(LTM-125U)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。

LINE SURGE PROTECTOR "LITOL" has been developed as an effective means of protecting every electronic equipment and machinery especially from surge voltages in the form of induced lightning or electrical noises.

This series involve two types of functional products: tap box type protecting various electronic equipments, and popular type able to be installed in control box.

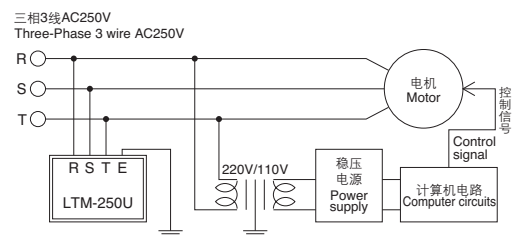
## Features

- Compact design for extremely easy handling and installation.
- Fast response to surges ensures effective equipment protection.
- LTB-15-8(M) has surge protective effect to power and telephone line.
- LTM-125U, 250U meet the standard for ClassII surge protective device (SPD) in accordance with JIS C5381-1.

## Applications

- Computer, modem, facsimile, POS system, vending machine, electric equipment etc.(LTB-15-8(M))
- NC tooling machine, arc discharge tooling machine, robot etc.(LTM-125U, LTM-250U)

LTM-250U



(Wiring method)

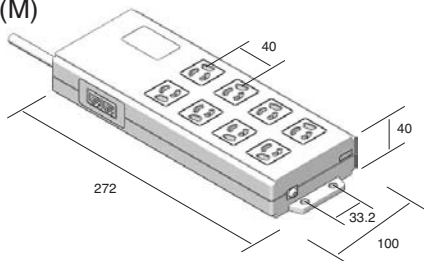
There are name plates of R, S(N), T, E in power line input of machine control panel. Please connect corresponding parts of "LTM-250U(LTM-125U)" to the above, like R-R, S-S(N-N), T-T and E-E.

## 型号构成 Part number system

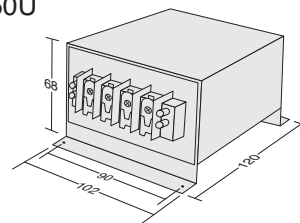


## 形状·尺寸 Dimensions

LTB-15-8(M)



LTM-125U  
LTM-250U



单位: mm  
Unit: mm

## 特性 Characteristics

系列 Series	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)	
DLSP	LTB-15-8(M)	AC125V (单相3线) (Single-phase 3 wire)	—	— 2)	—	
	LTM-125U	AC125V (单相3线) (Single-phase 3 wire)	3kA (8/20μs)	5kA (8/20μs)	线—线 Line to line	1.2kV
					线—GND Line to GND	1.5kV
	LTM-250U	AC250V (3相3线) (Three-phase 3 wire)	3kA (8/20μs)	5kA (8/20μs)	线—线 Line to line	1.5kV
线—GND Line to GND					1.5kV	

1) 施加标称放电电流In=3kA(8/20μs)时。 Applying nominal discharge current In; 3kA(8/20μs)

2) 冲击量：电源线与接地线之间为2,000A(8/20μsec)、电话线路与接地线之间为1,500A(8/20μsec)。

Surge current capability : 2,000A (8/20 usec) between Power lines and line to ground, 1,500A (8/20 usec) between Telephone lines and line to ground.

# DIA环形压敏电阻 (DRV)

# DIA RING VARISTOR (DRV)

DIA环形压敏电阻是用于消除各种小型电机的火花、防止噪声的半导体陶瓷元件。非线性系数( $\alpha$ )及静电容量大, 防噪声性能优异。

DIA RING VARISTOR has been specially designed for the application of spark elimination and noise protection of various compact DC motors. It is most suitable for noise-proof because of high non-linear coefficient ( $\alpha$ ) and high capacitance.



浪涌吸收器  
SURGE ABSORBER

## 特点

- 电压非线性系数( $\alpha$ )实际高达3~7, 静电容量(C)也高达5,000~30,000pF, 可在很大的频率范围内抑制噪声。
- 耐热强度大, 无需预热即可进行焊接。
- 温度特性优异。

## Features

- High non-linearity of V-I characteristic ( $\alpha$ :3~7) and a high capacitance (C:5,000~30,000pF) enable application for noise protection over wide frequency range.
- High heat resistance for soldering without pre-heating.
- Excellent temperature characteristics.

## 用途

- 消除各种小型直流电机的火花及防止噪声。

## Applications

- Spark elimination and noise protection of various compact DC motors.

## 型号构成 Part number system

DRV-T

系列名  
Series

AZ

形状  
Shape

—

160

E<sub>10</sub>电压  
E<sub>10</sub>voltage

M

E<sub>10</sub>容许偏差  
E<sub>10</sub> tolerance

3P

表面电极数  
Number of poles

B

电极形状  
Shape of termination

R

背面电极标记  
Back face pole

前2位数字表示E<sub>10</sub>电压值的有效数字, 第3位数字表示10的乘幂。  
The first two digits are significant, the third is the number of zeros.

例) 16 × 10<sup>0</sup> = 16V  
Ex.) 16 × 10<sup>0</sup> = 16V

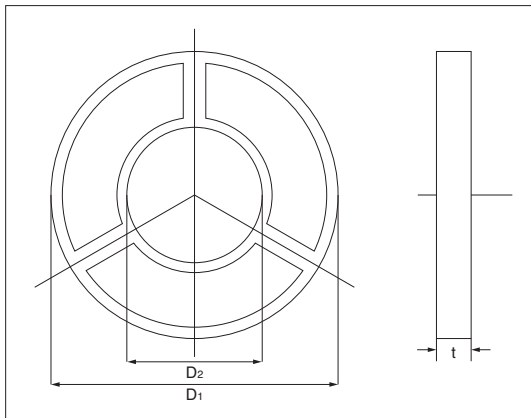
M	±20%
N	±30%

3P	3极 3 Terminals
5P	5极 5 Terminals

B	电极面积大 larger area
无 None	电极面积小 smaller area

R	背面电极 With back face pole 有Be
---	------------------------------------

## 形状·尺寸 Dimensions



形状 Shape	内径 D2 Inner dia. D2 (mm)	外径 D1 Outer dia. D1 (mm)	厚度 t Thickness t (mm)	电极数 Number of poles	E <sub>10</sub> 电压 E <sub>10</sub> voltage (V)
AW	ø5.0 <sup>+0.2</sup> <sub>-0.1</sub>	ø8.0±0.2	0.6 <sup>+0</sup> <sub>-0.2</sub>	3, 5	10~38
AY	ø5.80±0.15	ø9.3±0.2	0.7±0.1		
AZ	ø6.8±0.2	ø10.7±0.2	1.05max.		
A3	ø7.4±0.2	ø11.7±0.2	1.0±0.2	3, 5	16~60
AV	ø8.5±0.2	ø12.4±0.2	1.00±0.20		
A110	ø9.6±0.2	ø15.4±0.2	0.90±0.15	3, 5	12~55

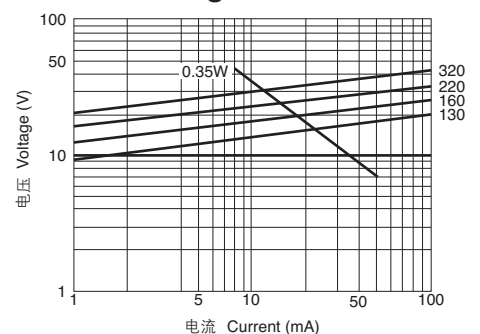
## 特性 Characteristics

型号 Part number	E <sub>10</sub> 电压 E <sub>10</sub> voltage (V)	非线性系数 $\alpha$ Non-linear coefficient $\alpha$		静电容量 C(nF) Capacitance C(nF)		额定功率 Rated power (W)	电机适用电压 Rated voltage of motor (V)
		标准值 Standard	参考值 Typical value	标准值 Standard	参考值 Typical value		
DRV-TAZ-130M3PBR	10.4~15.6	4.0min.	5.0	12min.	15	0.35	9
DRV-TAZ-160M3PBR	12.8~19.2	4.0min.	5.0	10min.	15		12
DRV-TAZ-220M3PBR	17.6~26.5	4.0min.	6.0	8min.	8		16
DRV-TAZ-320M3PBR	25.6~38.4	4.0min.	6.0	6min.	8		24
DRV-TAZ-550M3PBR	44.0~66.0	4.0min.	7.0	4min.	6		32

※有关E<sub>10</sub>电压范围、形状及尺寸等其他项目, 请垂询本公司。

※Please consult us for range of E<sub>10</sub> voltage, shape and dimensions.

## 电压-电流特性 Current-voltage characteristics



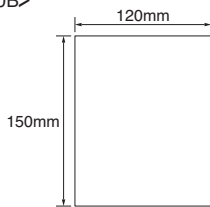
## 包装数量及包装形式 Packing quantity·Packing form

形式 Form	CSA10:数量 CSA10/Unit quantity	CSA20,CSZ20,CSA30,CSZ30:数量 CSA20,CSZ20,CSA30,CSZ30 /Unit quantity	CSA70, CDA70:数量 CSA70, CDA70/Unit quantity	DSA:数量 DSA/Unit quantity	DA38:数量 DA38/Unit quantity	DA53:数量 DA53/Unit quantity	DB60:数量 DB60/Unit quantity
散袋装 Bulk packing in plastic bag	B类: 500个/袋 B type: 500pcs/bag	B类: 500个/袋 B type: 500pcs/bag	B类: 1000个/袋 B type: 1000pcs/bag	A类: 100个/袋 A type: 100pcs/bag S类: 200个/袋 S type: 200pcs/bag -05F25: 100个/袋 -05F25: 100pcs/bag -U10T: 100个/袋 -U10T: 100pcs/bag	B类: 200个/袋 B type: 200pcs/bag	F类: 100个/袋 F 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)					A21F: 800个/箱 A21F: 800pcs/box		
径向编带(箱装) Radial taping (in box)							1000个/箱 1000pcs/box
SMD编带(卷装) SMD taping (in reel)	T type: 4000个/卷 T type: 4000pcs/reel	T type: 2000个/卷 T type: 2000pcs/reel					

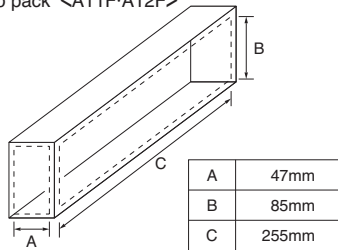
形式 Form	DSP:数量 DSP/Unit quantity	高电压DSP:数量 High voltage DSP /Unit quantity	DSS:数量 DSS/Unit quantity	高电压DSS:数量 High voltage DSS /Unit quantity	DE37:数量 DE37/Unit quantity
散袋装 Bulk packing in plastic bag	S00B: 200个/袋 S00B: 200pcs/bag				
轴向编带(箱装) Axial taping (in box)	A11F: 2000个/箱 A11F: 2000pcs/box A21F: 2000个/箱 A21F: 2000pcs/box A12F: 2000个/箱 A12F: 2000pcs/box A22F: 2000个/箱 A22F: 2000pcs/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		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.

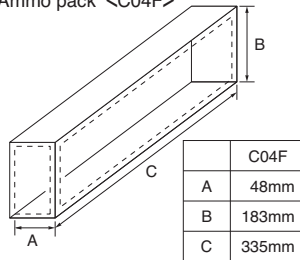
散袋装 <S00B>  
Bulk <S00B>



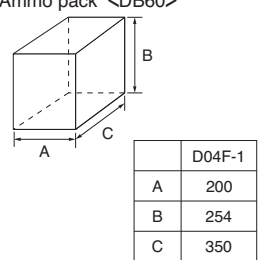
扁平包装 <A11F · A12F>  
Ammo pack <A11F-A12F>



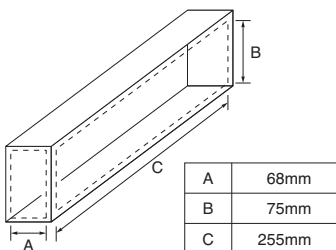
扁平包装 <C04F>  
Ammo pack <C04F>



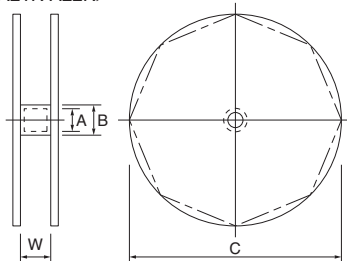
扁平包装 <DB60>  
Ammo pack <DB60>



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



卷盘包装 <A21R · A22R>  
Reel <A21R-A22R>



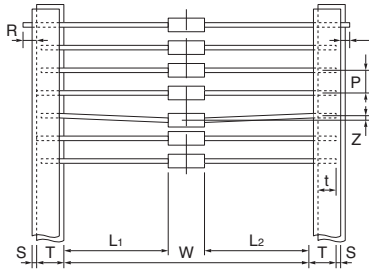
包装袋  
<CSA20, CSZ20, CSA30, CSZ30, CSA70, CDA70>  
Bulk  
<CSA20, CSZ20, CSA30, CSZ30, CSA70, CDA70>



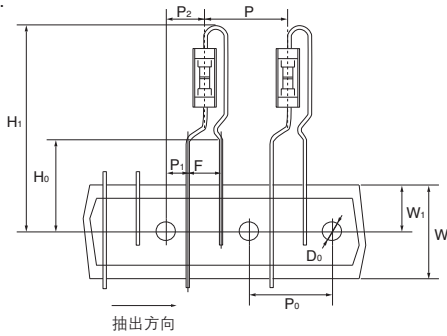


## ■ 编带 Taping

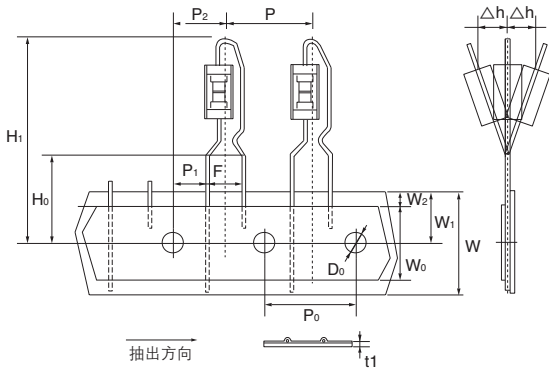
轴向编带 Axial taping



径向编带: C04F  
 ※ 不适应高压DSP、高压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.

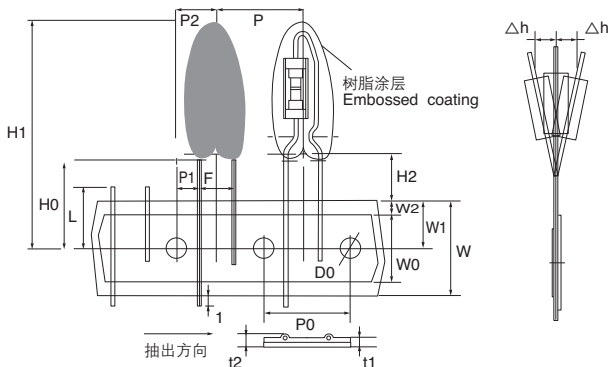


径向编带: D04F  
 ※ 不适应高压DSP、高压DSS系列及超过DE37-272M以上规格产品。  
 Radial taping:D04F  
 High voltage DSP, high voltage DSS and more than DE37-272M is not provided in this form.



径向编带 (DB系列)

Radial taping (DB Series)



记号 Symbol	轴向编带 Axial Taping(mm)			
	A11	A21	A12	A22
W	26 $\begin{smallmatrix} +1.5 \\ -0.0 \end{smallmatrix}$	52 $\begin{smallmatrix} +2.0 \\ -1.0 \end{smallmatrix}$	26 $\begin{smallmatrix} +1.5 \\ -0.0 \end{smallmatrix}$	52 $\begin{smallmatrix} +2.0 \\ -1.0 \end{smallmatrix}$
P	5.0±0.5		10.0±0.5	
L1-L2	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。 Terminal must not project from tape.			
t	3.2以上 3.2min.			
S	0.8以下 0.8max.			

记号 Symbol	径向编带C04F Radial Taping C04F (mm)
P	12.7±1.0
P <sub>0</sub>	12.7±0.3
P <sub>1</sub>	3.85±0.5
P <sub>2</sub>	6.35±1.3
F	5.0±0.5
W	18.0 $\begin{smallmatrix} +1.0 \\ -0.5 \end{smallmatrix}$
W <sub>1</sub>	9.0±0.5
H <sub>0</sub>	16.0±0.5
H <sub>1</sub>	32.2以下 (32.2max.)
D <sub>0</sub>	φ4.0±0.2

记号 Symbol	径向编带D04F Radial Taping D04F (mm)
P	12.7±1.0
P <sub>0</sub>	12.7±0.3
P <sub>1</sub>	3.85±0.5
P <sub>2</sub>	6.35±1.0
F	5.0±0.5
W	18.0 $\begin{smallmatrix} +1.0 \\ -0.5 \end{smallmatrix}$
W <sub>0</sub>	13.0±0.5
W <sub>1</sub>	9.0±0.5
W <sub>2</sub>	3.0max.
H <sub>0</sub>	16.0±0.5
D <sub>0</sub>	4.0±0.2
Δh	2.0max.
H <sub>1</sub>	31.0max.
t <sub>1</sub>	0.6±0.3

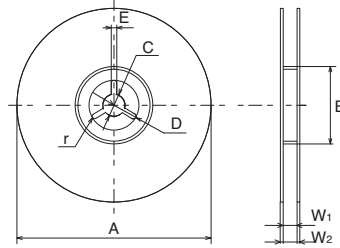
单位 unit (mm)

记号 Symbol	尺寸 Dimensions	容许偏差 Tolerance	记号 Symbol	尺寸 Dimensions	容许偏差 Tolerance
P	12.7	±1.0	H0	15.0	±2.5
P <sub>0</sub>	12.7	±0.3	D0	4.0	±0.2
P <sub>1</sub>	3.85	±0.5	L	11.0	Max.
P <sub>2</sub>	6.35	±1.0	l	1.0	Max.
F	5.0	±0.5	Δh	2.0	Max.
W	18.0	$\begin{smallmatrix} \pm 1.0 \\ -0.5 \end{smallmatrix}$	H1	32.0	Max.
W <sub>0</sub>	13.0	±0.5	H2	3.5	Min.
W <sub>1</sub>	9.0	±0.5	t1	0.6	±0.3
W <sub>2</sub>	3.0	Max.	t2	1.5	Max.

■SMD编带 (CSA10系列)  
SMD Taping (CSA10 Series)

包装记号 Packing code	系列 Series	包装数量 Packing Qty
T	CSA10	4,000

卷盘 Reel



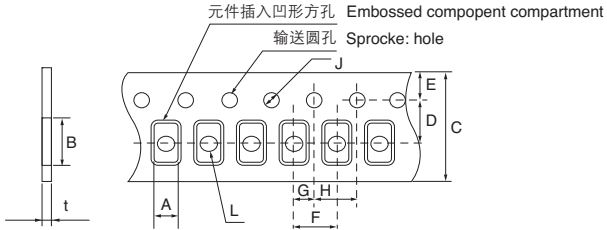
塑料卷盘 (标准型) Reel

单位 unit (mm)

A	B	C	D
$\varnothing 180_{-3.0}^{+0}$	$\varnothing 60_{+0.0}^{+1.0}$	$\varnothing 13.0 \pm 0.2$	$R10.5 \pm 0.4$
E	W <sub>1</sub>	W <sub>2</sub>	r
$2.0 \pm 0.5$	$9.0 \pm 0.3$	$11.4 \pm 1.0$	0.5

纸载带 Paper carrier tape

单位 unit (mm)



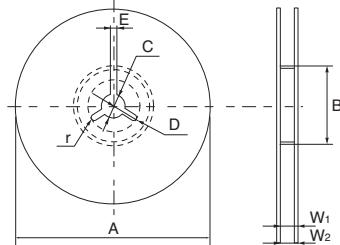
形状 mark	A	B	C	D	E	F
CSA10	$1.10 \pm 0.05$	$1.90 \pm 0.05$	$8.00 \pm 0.2$	$3.50 \pm 0.05$	$1.75 \pm 0.10$	$4.00 \pm 0.10$
形状 mark	G	H	J	t <sub>1</sub>		
CSA10	$2.00 \pm 0.05$	$4.00 \pm 0.10$	$\varnothing 1.5 \pm 0.10$ -0.00	$0.98 \pm 0.05$		

D,G的尺寸为每个袋子的中心值

■SMD编带 (CSA20/CSZ20系列)  
SMD Taping (CSA20/CSZ20 Series)

包装记号 Packing code	系列 Series	包装数量 Packing Qty
T	CSA20 CSZ20	2,000

卷盘 Reel



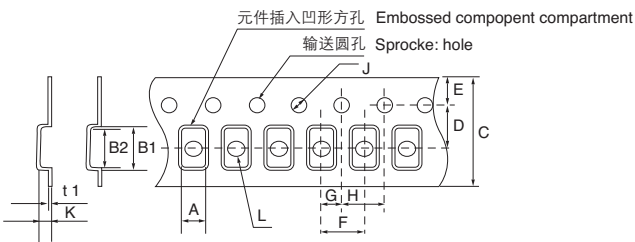
塑料卷盘 (标准型) Reel

单位 unit (mm)

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

塑料载带 Plastic carrier tape

单位 unit (mm)

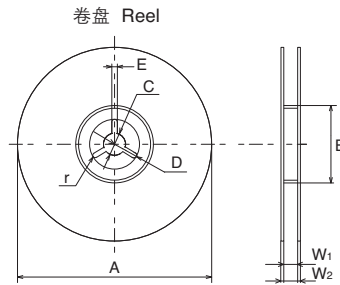


形状 mark	A	B	C	D	E	F
CSA20 CSZ20	$1.45 \pm 0.1$	$2.2 \pm 0.1$	$8.0 \pm 0.2$	$3.50 \pm 0.05$	$1.75 \pm 0.1$	$4.0 \pm 0.1$
形状 mark	G	H	J	K	L	t <sub>1</sub>
CSA20 CSZ20	$2.00 \pm 0.05$	$4.0 \pm 0.1$	$\varnothing 1.5 \pm 0.1$ -0	$1.42 \pm 0.05$	$\varnothing 1.0 \pm 1.0$ -0	$0.25 \pm 0.05$

D,G的尺寸为每个袋子的中心值

■SMD编带 (CSA30/CSZ30系列)  
SMD Taping (CSA30/CSZ30 Series)

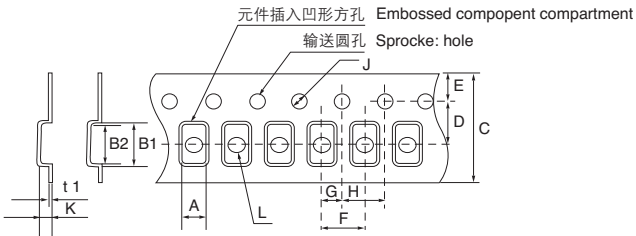
包装记号 Packing code	系列 Series	包装数量 Packing Qty
T	CSA30 CSZ30	2,000



塑料卷盘 (标准型) Reel 单位 unit (mm)

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

塑料载带 Plastic carrier tape

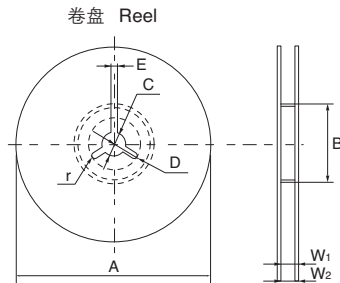


单位 unit (mm)

形状 mark	A	B	C	D	E	F
CSA30 CSZ30	$1.85 \pm 0.05$	$3.50 \pm 0.05$	$8.0 \pm 0.1$	$3.50 \pm 0.05$	$1.75 \pm 0.1$	$4.0 \pm 0.1$
形状 mark	G	H	J	K	L	t1
CSA30 CSZ30	$2.00 \pm 0.05$	$4.0 \pm 0.1$	$\text{Ø}1.55 \pm 0.05$	$1.80 \pm 0.05$	$\text{Ø}1.05 \pm 0.05$	0.25以下

■SMD编带 (CSA70/CDA70系列)  
SMD Taping (CSA70/CDA70 Series)

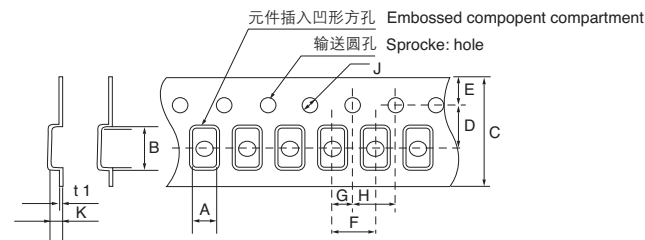
包装记号 Packing code	系列 Series	包装数量 Packing Qty
T	CSA70 CDA70	2,000



塑料卷盘 (标准型) Reel 单位 unit (mm)

A	B	C	D
ø382以下	ø50.0以上	$\text{Ø}13.0 \pm 0.2$	$21 \pm 0.8$
E	W <sub>1</sub>	W <sub>2</sub>	r
$2.0 \pm 0.5$	$13.0 \pm 0.5$	18.4以下	1.0

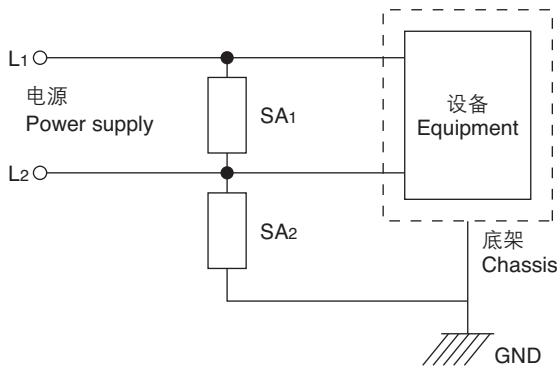
塑料载带 Plastic carrier tape



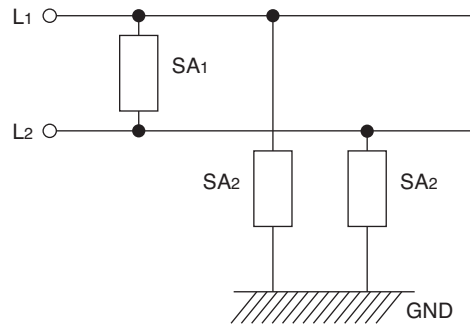
单位 unit (mm)

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

1. 需要进行AC耐电压试验的电源  
Power supply requiring AC withstanding voltage test



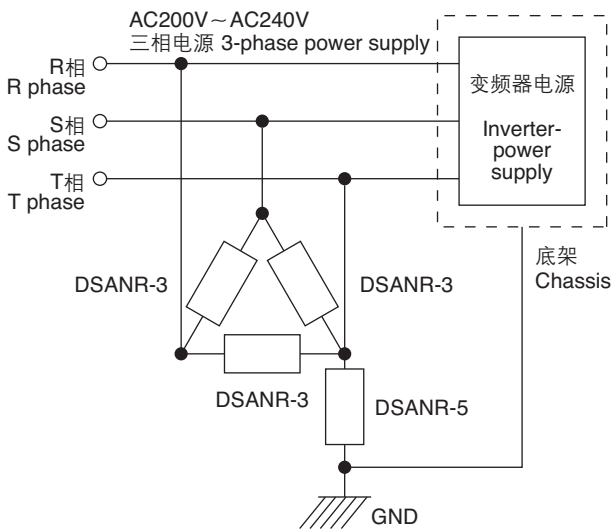
2. 高可靠性电源  
High quality supply



条件 Conditions	额定电路电压 Rated voltage	AC125V	AC250V
正常模式 (L1 - L2之间) Normal mode (Between L1 and L2)	SA1	DSANR-1 DSAZR1-301L	DSANR-3 DSAZR2-501M
共用模式 (L1、L2 - GND之间) Common mode (Between L1, L2-GND)	SA2	Test is not required	DSANR-3 DSAZR2-501M
	AC1200V	DSANR-4 DSAZR1-242M	DSAZR2-242M
	AC1500V	DSANR-5 DSAZR1-302M	DSANR-5 DSAZR2-302M
	AC1800V	DSANR-6 DSAZR1-362M	DSANR-6A DSAZR2-362M
AC耐电压试验条件 AC withstanding voltage test condition	AC2000V	DSANR-10B DSAZR1-452M	DSANR-10B DSAZR2-452M

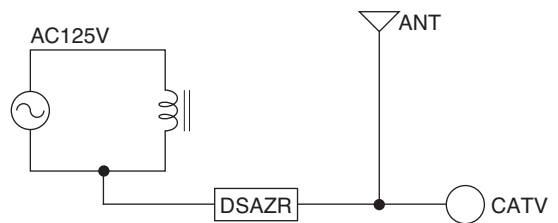
应用例：SW电源、变频器电源、OA设备及家用电器的电源  
Applications : SW power supply, inverter power supply, power supply of office and home appliance

3. 使用三相电源的设备  
Equipment using a three-phase power supply

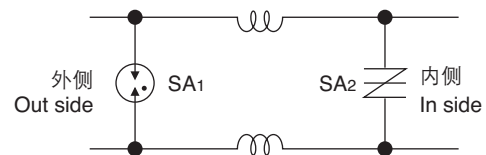


※在(R、S、T相)-GND之间进行AC 1500V绝缘耐压试验的实例。  
※Example of a dielectric withstanding voltage test carried out at a voltage of AC 1500V applied between the RST phases and the ground.

4. 电视天线电路  
TV tuner circuit : cold chassis



5. 传感器及数据线  
Sensor and data line

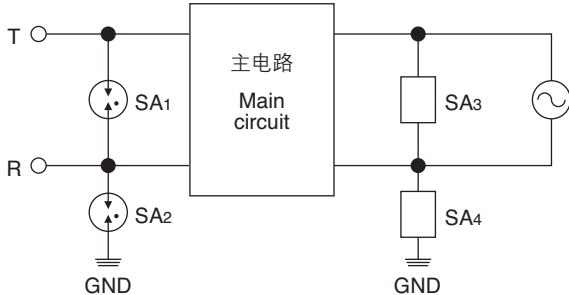


SA1: DSS-201M  
SA2: 硅型吸收器 (30V)  
Silicon type Absorber (30V)

6. 连接到电话线路的设备

Telecommunication equipment  
(FAX, KTS, PBX)

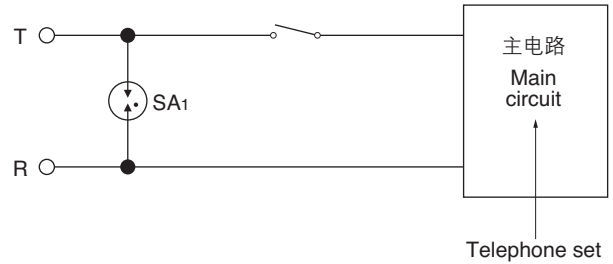
通信设备



Telephone

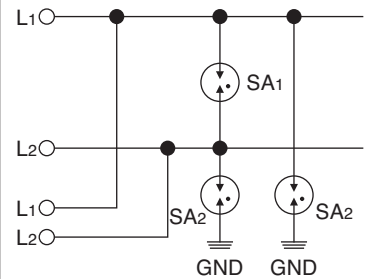
(One piece, cordless, answering machine)

电话机



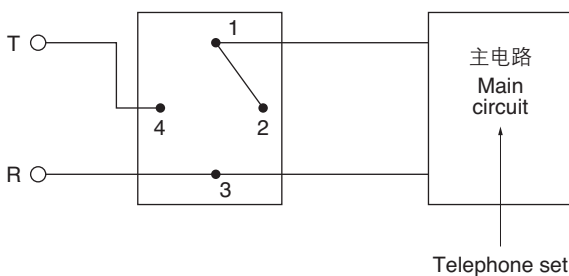
	通信线路 Telecommunication interface		电源 Power supply	
			AC125V	AC250V
正常模式 Normal mode	T~R间 Between T and R. SA1	日本、美国、欧洲、东南亚 Japan, USA, EU and South East Asia DSS-301L CSA70-301L 加拿大 Canada DSS-401M CSA70-401L	SA3 DSANR-1 DSAZR1-301L	DSANR-3 DSAZR2-501M
共用模式 Common mode	T,R~GND间 Between T, R and GND. SA2	不需要AC耐电压试验 AC withstanding test is not required 与SA1相同 Same as SA1 需要AC耐电压试验 AC withstanding test is required AC1200V→ DSA-242MA AC1500V→ DSA-302MA	SA4 DSANR-4 DSAZR1-242M	DSANR-5 DSANR-6A DSAZR2-302M DSAZR2-362M

调制解调器  
Modem



应用例：传真机、按键式电话系统、PBX、调制解调器、录音电话、无绳电话、电话机等。  
Applications : key telephone system, PBX, modem, answering phone, cordless telephone, normal telephone etc.

7. 过电压试验电路(DSSV-YD)  
Overvoltage test circuit (DSSV-YD)



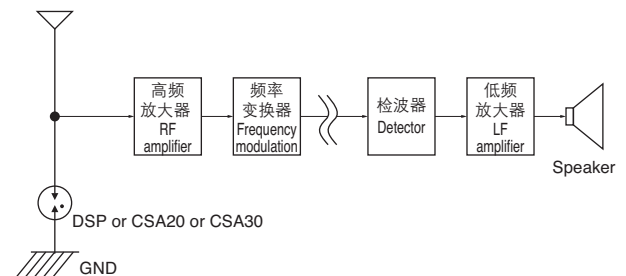
在DSSV-YD型中，当在T~R间外加过电压时，与通信线路串联的金属导线开路，使通信线路中断。

When the applied overvoltage is between tip and ring, the communication line is cut off by the wire opening.

8. 汽车收音机、无线电设备  
Car radio, wireless

插入天线输入部，防止从天线侵入的静电浪涌所引起的对前端集成电路或场效应管等损坏。

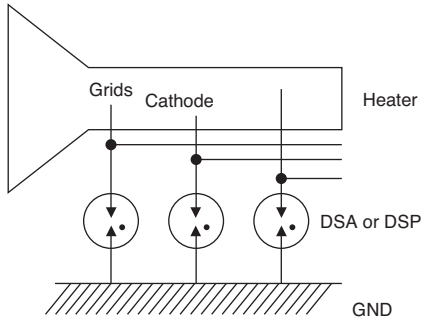
Inserted in the antenna input terminal, the surge absorber will protect the semiconductor (front-end IC or FET, etc.) against failure due to static surge entering from the antenna.



9. CRT (Cathode Ray Tube)

(DSA and DSP series protect display driver IC and transistors from damage due to ingress of static surge.)

防止因CRT管异常放电产生的静电损坏驱动IC或晶体管。



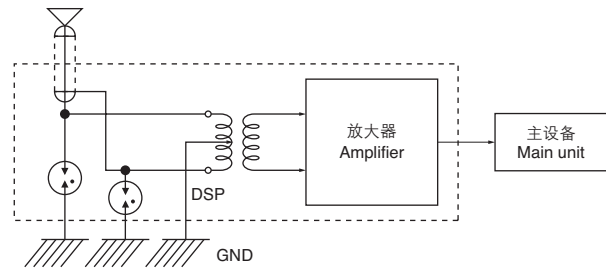
显示屏尺寸 Screen size	15英寸以下 15" under	15英寸以上 15" up
阴极~GND间 Between cathode and GND	DSP-201M DSP-301N	DSA-301LA DSA-501MA
灯丝 Heater	DSP-201M DSP-301N	DSA-301LA DSA-501MA
栅极~GND间 Between grids and GND	DSP-501N DSP-751N DSP-102M DSP-152M DSP-272M DSP-302M	DSA-102MA DSA-242MA DSA-152MA DSP-102M DSP-152M DSP-272M DSP-302M

注：用于本电路时，请检查有无延期保持现象。  
Note : For this application, please check for hold over.

10. 各种天线放大器 (卫星广播用、一般电视设备用)  
Boosters (for satellite broadcasting and general TV equipment)

用于防止从天线附近侵入的微小浪涌能量或者人体接触而引起的静电对半导体造成损坏。尤其是当今随着高灵敏度场效应管使用的增加，防浪涌措施必不可少。

In this application, the surge absorber protects the semiconductor against small surge energies from the vicinity of the antenna or against static electricity due to human contact. The recent use of high-sensitivity FET has led to a stronger requirement for surge protection.



11. 共振措施

Resonance measure

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(common mode coil)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. Potential equalization before and behind the common mode coil by a surge absorber; SA2, is recommended as a measure.

使用浪涌吸收器

- SA1: 没有AC耐压测试时 AC125V用...DSA-301LA  
AC250V用...DSA-501MA
- 有AC耐压测试时 AC1,200V 3秒...DSA-242MA, DA38-272M  
AC1,500V 1分...DSA-302MA, DA38-302M  
AC1,800V 3秒...DSA-362MA, DA38-362M

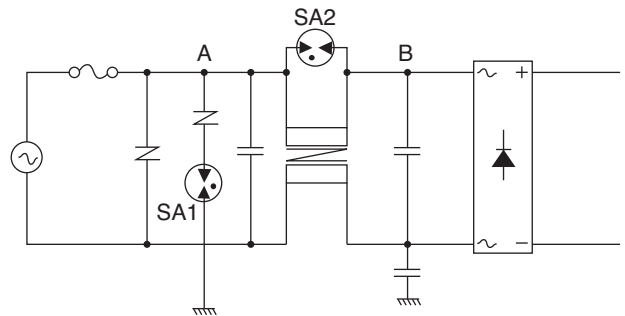
变阻器(与SA1连接): AC125V用...V1mA=270V, AC250V用...V1mA=470V  
SA2: CSA70-301L, CSA70-401L, DE37-401W, DE37-501M, DSS-301L

Recommended Parts

- SA1: AC withstanding test is not required;  
AC125V...DSA-301LA  
AC250V...DSA-501MA
- AC withstanding test is required;  
AC1,200V 3sec...DSA-242MA, DA38-272M  
AC1,500V 1min...DSA-302MA, DA38-302M  
AC1,800V 3sec...DSA-362MA, DA38-362M

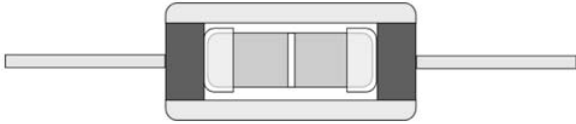
Varistor connected with SA1 in series: AC125V...V1mA=270V, AC250V...V1mA=470V

SA2: CSA70-301L, CSA70-401L, DE37-401W, DE37-501M, DSS-301L



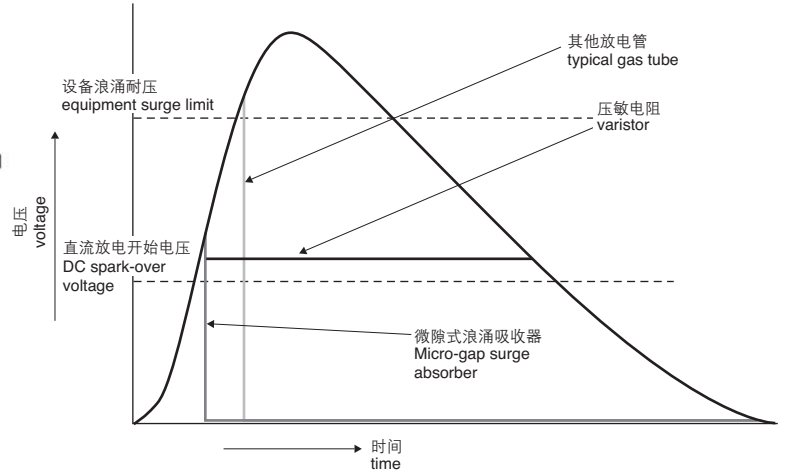
## 微隙方式的特点

- 对高速冲击的响应性良好。
- 无明显场所的特性差异。
- 绝缘阻抗值极高： $10^7 \Omega$ 以上。
- 静电容量小：1pF以下。
- 无极性。



## Features of the Micro-Gap

- Response to quick rise time of surge is good.
- Same quick response in dark or light.
- High Insulation Resistance: Greater than  $10^7 \Omega$ .
- Low Capacitance: Less than 1pF.
- No polarity.



## 验收测试

您在防浪涌方面有以下问题吗？

- 开发中的设备无法通过UL等规格的要求。
- 市场上的电子设备常常因感应雷击而遭破坏，希望采取保护措施。

三菱综合材料的陶瓷工厂备有各种规格的脉冲电压发生器及脉冲电流发生器，我们会与客户共同进行浪涌试验，提供最完善的解决方案。

## Test facilities

Troubled with surge requirements?

- Products being developed can't meet UL standards.
- Need to protect equipment from indirect lightning surges in the field.

At Mitsubishi Materials ceramic factory, customers can come and observe testing of their product with the latest impulse voltage and current generators that can duplicate the test requirements of the various worldwide standards agencies. From these tests we can recommend the best solution to help you pass requirements.

相关规格 Reference standard	波形 Wave form	备注 comments
JEC规格 JEC standard	1.2/50 $\mu$ s 30kVmax	保护电源免遭间接雷击的损害 Indirect lightning protection
	8/20 $\mu$ s 6kAmax	
IEC61000-4-5标准 IEC61000-4-5 conformance	1.2/50 $\mu$ s 15kV 8/20 $\mu$ s 7.5kA	保护电源免遭间接雷击的损害 Indirect lightning protection
IEC61000-4-2标准 IEC61000-4-2 conformance	150pF 330 $\Omega$ 30kVmax	防静电 Static electricity protection
FCC规格 FCC standard	10/560 $\mu$ s 800V 100A	保护通信设备 Communication related protection
FCC规格 FCC standard	10/160 $\mu$ s 1.5kV 200A	保护通信设备 Communication related protection
FCC规格标准 FCC standard conformance	10/700 $\mu$ s 15kVmax	保护通信设备 Communication related protection
IEEE	0.5 $\mu$ -100kHz 6kVmax	保护通信设备(AC电源交叉) Communications (AC power cross)
UL规格 UL standard	AC600V 40A 1.5s	
	AC600V 7A 5s	
	AC600V 2.2A 30min 最大为AC600V的过电压 Over-voltage to AC600V	
其他 others	矩形波脉冲宽度50~1000ns 4kVmax 30~60Hz Rectangular wave, pulse width 50~1000ns, 4kV max, 30~60Hz	
	2/10 $\mu$ s 2.5kV 1kA	
	10/200 $\mu$ s 20kVmax	
	0.5/700 $\mu$ s 6kVmax	
	100/700 $\mu$ s 5kVmax	

※对于其他规格，请与我司协商。  
Please talk about the other standards.

## ■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.



## 贴片型EMI滤波器一览表

## Chip type EMI filters

	型号 Part number	形状 Style	等效电路 Equivalent circuit	截止频率 Cut-off frequency	用途 Applications	特点 Features	页码 Page			
3端子型 信号线路用 3 Terminals For Signal Lines	LCA10,LCA20			<ul style="list-style-type: none"> <li>• LCA10 : 50MHz~270MHz</li> <li>• LCA20 : 47MHz~220MHz</li> </ul>	<ul style="list-style-type: none"> <li>• 电视机、录像机、DVD等数字影像设备</li> <li>• 传真机、调制解调器、ADSL终端等信息通信设备</li> <li>• 复印机、电脑、游戏机等数码设备</li> <li>• 其它各种电子设备的降噪措施</li> <li>• For digital AV equipment such as TV, VCR and DVD.</li> <li>• For telecommunication equipment such as mobile phones Fax, modem and ADSL.</li> <li>• For computer equipment such as personal computers and copier.</li> <li>• For noise countermeasure of other digital circuit equipment.</li> </ul>	<ul style="list-style-type: none"> <li>• LCA系列是组合了L(电感器)和C(电容器)的高性能三端子表面贴装元件。采用本公司独有的小型、高性能化技术,与以往产品相比,衰减系数更大、除噪频带更宽,特别适用于高频、高速信号线的降噪。</li> <li>• LCA series, is an extremely efficient EMI filter with monolithic construction of inductor and capacitor elements, suitable for noise reduction on high frequency single line, due to steep and wide band insertion loss characteristics.</li> </ul>	39			
	LFA10			<ul style="list-style-type: none"> <li>• LFA10 : 22MHz~100MHz</li> </ul>	<ul style="list-style-type: none"> <li>• For noise countermeasure of other digital circuit equipment.</li> </ul>	<ul style="list-style-type: none"> <li>• 由L(电感器)和C(电容器)复合而成的高性能单片式EMI滤波器</li> <li>• 具有急剧的插入损失特性,可在宽频率范围内防止噪声</li> <li>• Extremely efficient EMI filter made of a combination of both dielectric and magnetic materials.</li> <li>• Well suited for eliminating noise on high frequency signal lines, due to steep insertion loss.</li> </ul>	40 41			
	LFA20			<ul style="list-style-type: none"> <li>• LFA20 : 10MHz~220MHz</li> </ul>						
	LFA30			<ul style="list-style-type: none"> <li>• LFA30 : 10MHz~220MHz</li> </ul>						
	3端子型 电源线路用 3 Terminals For Power Supply Lines	LCG14			<ul style="list-style-type: none"> <li>• LCG14 : 220MHz~230MHz</li> </ul>	<ul style="list-style-type: none"> <li>• 便携设备及各种电子设备的降噪措施</li> <li>• 数字影像设备等各种电子设备的降噪措施</li> <li>• 便携设备及各种电子设备的降噪措施</li> <li>• EMI solution for telecommunication equipment such as mobile phone.</li> <li>• EMI solution for Digital Equipment</li> <li>• Suitable for High-speed bass line,I/O</li> </ul>	<ul style="list-style-type: none"> <li>• 由L(电感器)和C(电容器)复合而成的高性能单片式EMI滤波器</li> <li>• 具有急剧的插入损失特性,可在宽频率范围内防止噪声</li> <li>• 1608形状</li> <li>• 2012形状</li> <li>• 4路阵列LC滤波器</li> <li>• LFH24系列为小型</li> <li>• LCA24系列为低容值型</li> <li>• LCA14系列为小型</li> </ul>	42		
		LCA14,LCA24			<ul style="list-style-type: none"> <li>• LCA14 : 150MHz~350MHz</li> <li>• LCA24 : 200MHz~270MHz</li> </ul>				<ul style="list-style-type: none"> <li>• Extremely efficient EMI filter with monolithic construction of inductor and capacitor elements.</li> <li>• Well suited for eliminating noise on high frequency signal lines, due to steep insertion loss.</li> <li>• 0603 size</li> <li>• 0805 size</li> <li>• 4 lines of LC filter.</li> <li>• LFH24 are a small type.</li> <li>• LCA24 are Low Capacitance type.</li> <li>• LCA14 are a small type.</li> </ul>	43
		LFA14,LFA24,LFH24			<ul style="list-style-type: none"> <li>• LFA14 : 110MHz</li> <li>• LFA24 : 47MHz~140MHz</li> <li>• LFH24 : 47MHz~140MHz</li> </ul>					
2端子型 信号线路用 2 Terminals For Signal Lines	LZA05			(中心频率/Center frequency) : 820MHz~2000MHz	<ul style="list-style-type: none"> <li>• 便携设备及各种电子设备的降噪措施</li> <li>• EMI solution for mobile electronic devices,etc.</li> </ul>	<ul style="list-style-type: none"> <li>• 本滤波器利用LC共振,可在宽频率范围内使用。同时,也是带阻型EMI滤波器,备有可选择阻带的产品系列。即使对于接地不稳定的设备、电路,也能发挥稳定的降噪方案效果。</li> <li>• Using LC resonance, this part works as a band stop filter with a wide selection of rejected frequency band, and shows effective noise reduction for equipment and circuits with unstable ground.</li> </ul>	46			
	LZA10			(中心频率/Center frequency) : 10MHz~470MHz				47		

# LC复合EMI滤波器(LCA10、LCA20)

# CHIP TYPE LC EMI FILTER (LCA10,LCA20)

LC复合EMI滤波器LCA是在1608和2125尺寸中组合了L(电感器)和C(电容器)的高性能三端子表面贴装元件。采用本公司独有的小型、高性能化技术,与以往产品相比,衰减系数更大、除噪频带更宽,特别适用于高频、高速信号线的降噪。

The LC EMI filter (LCA) is an extremely efficient EMI filter with monolithic construction of inductor and capacitor elements, suitable for noise reduction on high frequency single line, due to steep and wide band insertion loss characteristics.

## ■特点

- 超小型、薄型。
- 急剧的插入损失特性。
- 适用于宽频带的降噪。
- 无方向极性,使用方便。

## ■Features

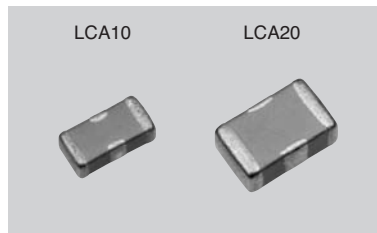
- Ultra miniature and low profile type
- Steep insertion loss characteristics
- Removes noise over a wide range
- Easy to place since there is no polarity

## ■用途

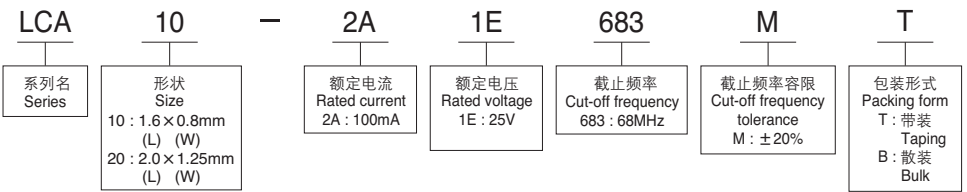
- 电视机、录像机、DVD等数字影像设备
- 传真机、调制解调器、ADSL终端等信息通信设备
- 复印机、电脑、游戏机等数码设备
- 其它各种电子设备的降噪措施

## ■Applications

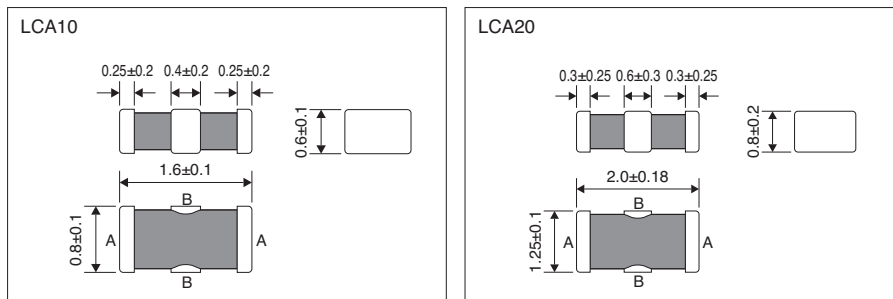
- For digital AV equipment such as TV, VCR and DVD.
- For telecommunication equipment such as Fax, modem and ADSL.
- For computer equipment such as personal computers and copier.
- For noise countermeasure of other digital circuit equipment.



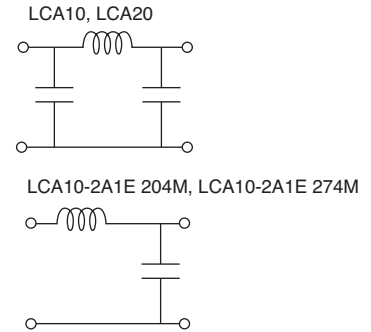
## ■型号构成 Part number system



## ■形状及尺寸 (mm) Dimensions (mm)



## ■等效电路 Equivalent circuits

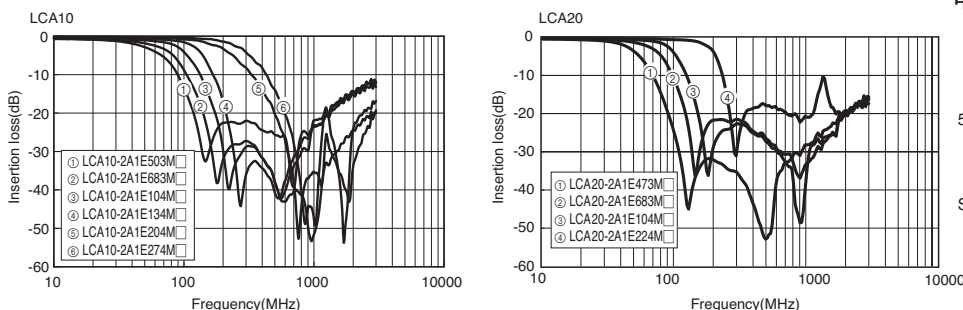


## ■型号一览表 Part number list

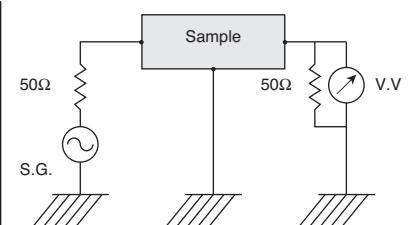
型号 Part number	截止频率 Cut-off frequency	截止频率容限 Cut-off frequency tolerance	额定电压 Rated voltage	额定电流 Rated current	绝缘阻抗 Insulation Resistance	静电容量 Capacitance (参考值Reference)	使用温度范围 Operating Temp. range
LCA10-2A1E503M□	50MHz	±20%	25V	100mA	10MΩmin.	55pF	-40°C ~ +85°C
LCA10-2A1E683M□	68MHz					55pF	
LCA10-2A1E104M□	100MHz					50pF	
LCA10-2A1E134M□	130MHz					50pF	
LCA10-2A1E204M□	200MHz					29pF	
LCA10-2A1E274M□	270MHz					16pF	
LCA20-2A1E473M□	47MHz					115pF	
LCA20-2A1E683M□	68MHz					58pF	
LCA20-2A1E104M□	100MHz					58pF	
LCA20-2A1E224M□	220MHz					32pF	

□: T为带装、B为散装  
 □: "T" stands for taping package and "B" stands for bulk package.

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



## ■电路图 Test circuit



LC复合EMI滤波器LFA10、LFA20、LFA30是采用将电介质和磁介质复合并一体化烧结而成的材料生产的高性能EMI滤波器。该产品具有超小型、薄型、无方向极性的特点，适合于高密度贴装。

Our "LFA10, LFA20, LFA30" chip type LC EMI filter is an extremely efficient EMI filter made of a combination of both dielectric and magnetic materials. They are well suited for elimination of noise on high frequency signal lines, due to their steep insertion loss characteristics.

## ■特点

- 采用诱导体和磁性体一体化的单片结构。
- 超小型、薄型。
- 急剧的插入损失特性。
- 适用于宽频带的降噪。
- 无方向极性，使用方便。

## ■Features

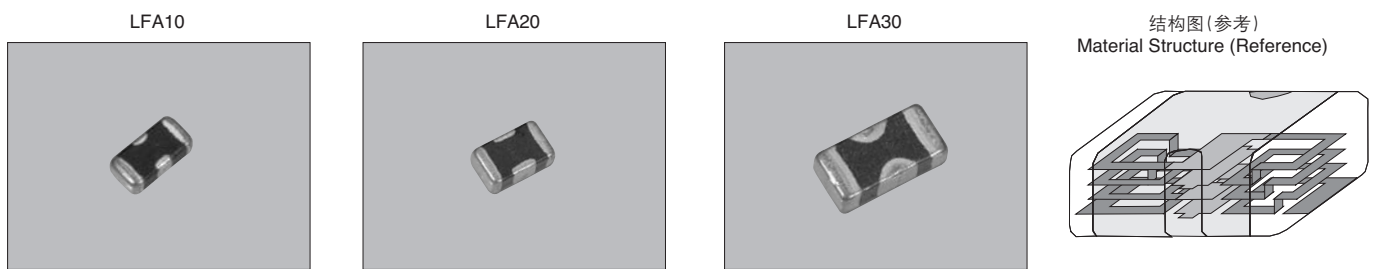
- Monolithic construction of dielectric and magnetic materials
- Ultra miniature and low profile type
- Steep insertion loss characteristics
- Removes noise over a wide range
- Easy to place since there is no polarity

## ■用途

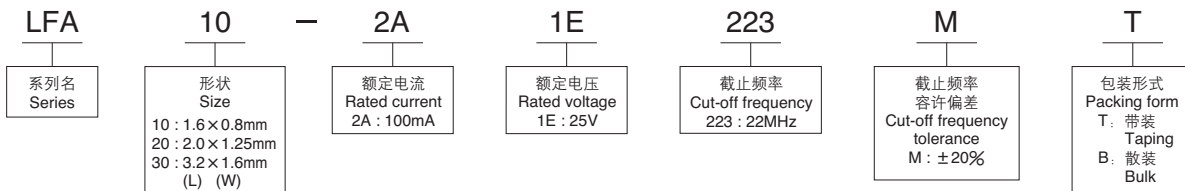
- 电视机、录像机、DVD等数字影像设备
- 传真机、调制解调器、ADSL终端等信息通信设备
- 复印机、电脑、游戏机等数码设备
- 其它各种电子设备的降噪措施

## ■Applications

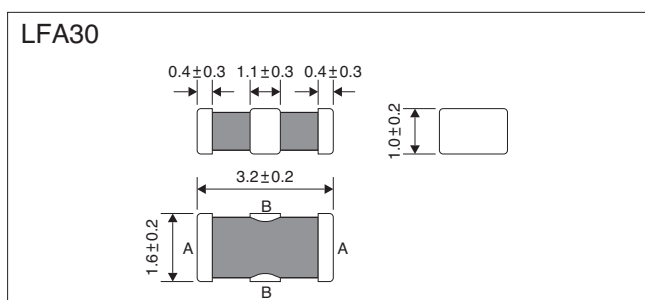
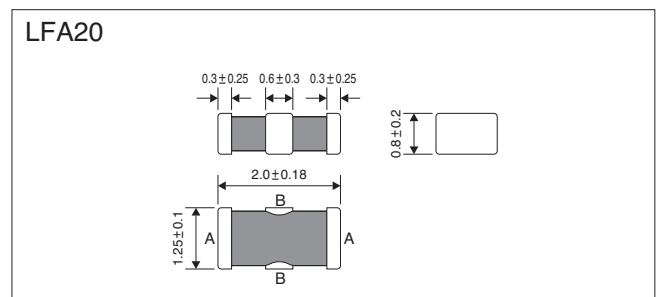
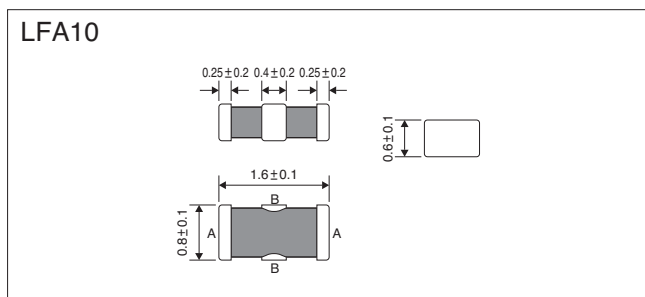
- For digital AV equipment such as TV, VCR and DVD.
- For telecommunication equipment such as Fax, modem and ADSL.
- For computer equipment such as personal computers and copier.
- For noise countermeasure of other digital circuit equipment.



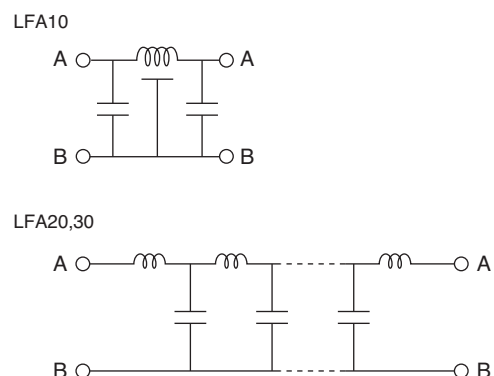
## ■型号构成 Part number system



## ■形状·尺寸(mm) Dimensions (mm)



## ■等效电路 Equivalent circuits



## 型号一览表 Part number list

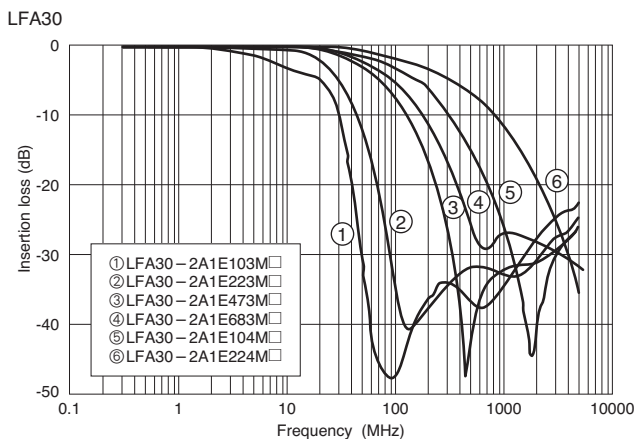
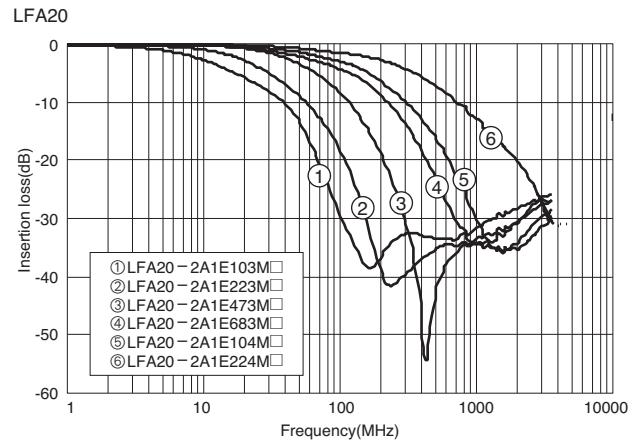
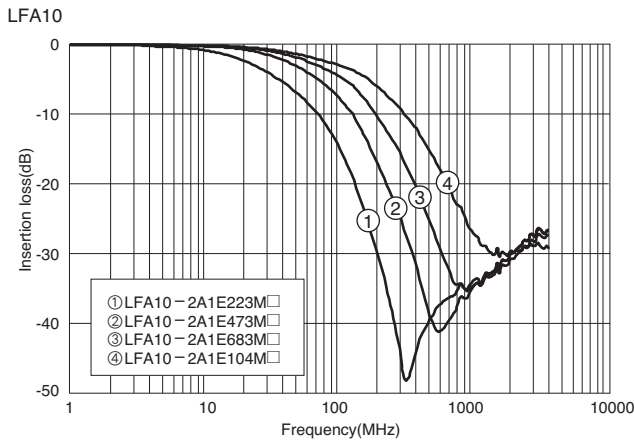
型号 Part number	截止频率 Cut-off frequency	截止频率容许偏差 Cut-off frequency tolerance	额定电压 Rated voltage	额定电流 Rated current	绝缘阻抗 Insulation Resistance	静电容量 Capacitance (参考值Reference)	使用温度范围 Operating Temp. range
<b>LFA10</b>		±20%	25V	100mA	10MΩmin.	-40°C~+85°C	
LFA10-2A1E223M□	22MHz						
LFA10-2A1E473M□	47MHz						
LFA10-2A1E683M□	68MHz						
LFA10-2A1E104M□	100MHz						
<b>LFA20</b>							
LFA20-2A1E103M□	10MHz						
LFA20-2A1E223M□	22MHz						
LFA20-2A1E473M□	47MHz						
LFA20-2A1E683M□	68MHz						
LFA20-2A1E104M□	100MHz						
LFA20-2A1E224M□	220MHz						
<b>LFA30</b>							
LFA30-2A1E103M□	10MHz						
LFA30-2A1E223M□	22MHz						
LFA30-2A1E473M□	47MHz						
LFA30-2A1E683M□	68MHz						
LFA30-2A1E104M□	100MHz						
LFA30-2A1E224M□	220MHz						

□: T表示带装, B为散装

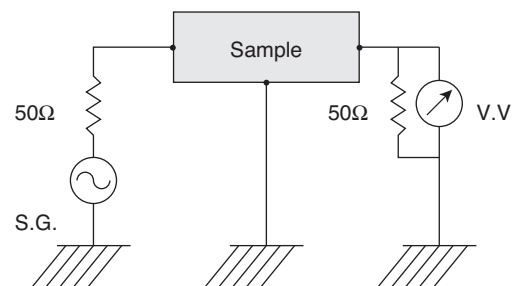
□: "T" stands for taping package and "B" stands for bulk package.

EMI FILTER

## 插入损失特性(参考) Insertion loss (Reference)



## 电路图 Test circuit



# LC复合EMI滤波器阵列(LCG14)

[对应地面数字电视广播 便携式终端 信号线用]

# CHIP TYPE LC EMI FILTER ARRAY (LCG14)

[For Signal Line of mobile device corresponding to terrestrial Digital Broadcast]

LC复合EMI滤波器LCG14是高性能EMI滤波器阵列，适用于便携式终端的地面数字电视广播频带和RF频带的降噪。该阵列滤波器在16×08尺寸的芯片上内置有4个π型电路，衰减系数大、除噪频带宽，适用于信号线的高频降噪。

The LC EMI filter array LCG14, highly effective to the noise filtering for the RF frequency band of a mobile phone. 4-line π type circuits of array filter are enclosed in a chip of 1.6mm×0.8mm size. It is suitable for high frequency noise filtering because of its large attenuation coefficient and deep wide noise removal band.

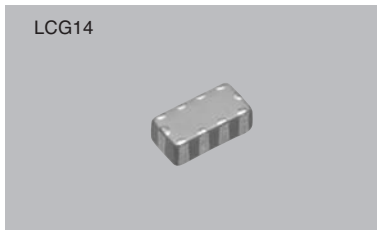
## 特点

- 超小型阵列产品，适用于高密度信号线。
- 在470MHz~770MHz和800MHz~2GHz的频带范围内具有很好的噪声衰减效果。
- 急剧的衰减特性，适用于高频信号线。
- 备有各种静电容量值的产品。
- 低静电容量型。

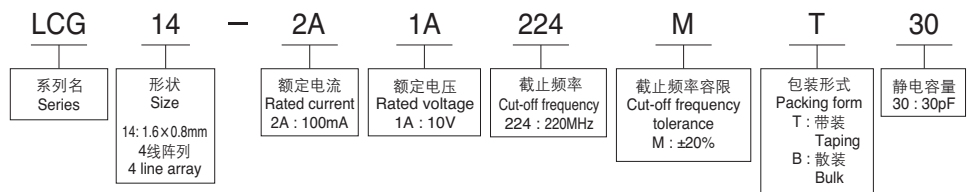
## 用途

- 手机、数字影像设备

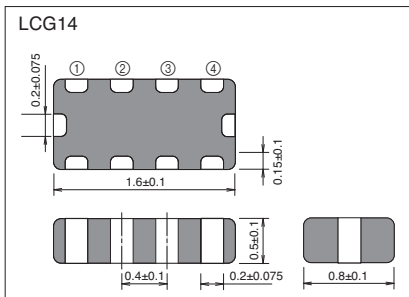
新产品



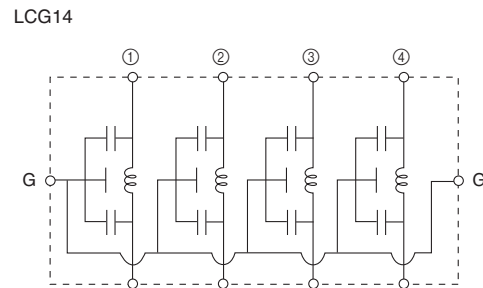
## 型号构成 Part number system



## 形状·尺寸(mm) Dimensions (mm)



## 等效电路 Equivalent circuits

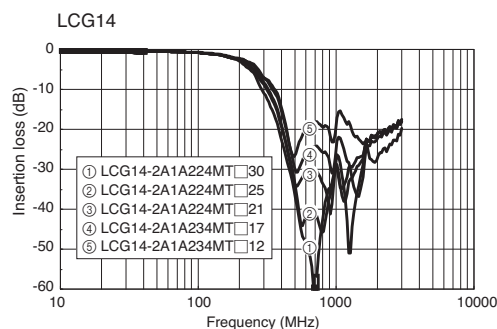


## 型号一览表 Part number list

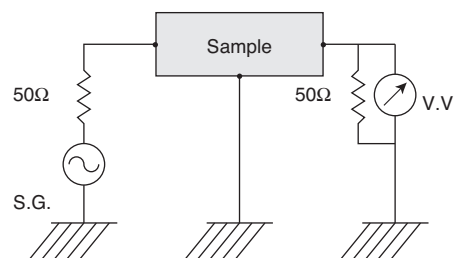
型号 Part number	截止频率 Cut-off frequency	截止频率容许偏差 Cut-off frequency tolerance	额定电压 Rated voltage	额定电流 Rated current	绝缘阻抗 Insulation Resistance	静电容量 Capacitance (参考值Reference)	使用温度范围 Operating Temp. range
LCG14-2A1A224M□30	220MHz	±20%	10V	100mA	10MΩmin.	30pF	-40°C ~ +85°C
LCG14-2A1A224M□25	220MHz					25pF	
LCG14-2A1A224M□21	220MHz					21pF	
LCG14-2A1A234M□17	230MHz					17pF	
LCG14-2A1A234M□12	230MHz					12pF	

- : T为带装、B为散装  
 □: "T" stands for taping package and "B" stands for bulk package.

## 插入损失特性(参考) Insertion loss (Reference)



## 电路图 Test circuit



# LC复合EMI滤波器阵列(LCA14、LCA24) [便携式终端 信号线用]

# CHIP TYPE LC EMI FILTER ARRAY (LCA14,LCA24) [For Signal Line]

LC复合EMI滤波器阵列LCA14、LCA24系列是高性能EMI滤波器阵列，适用于便携式终端RF频带的降噪。是内置4个LC多级电路的三端子型阵列，衰减系数大、除噪频带宽，适用于信号线的高频降噪。

The LC EMI filter array, LCA14, LCA24, is highly effective to the noise filtering for the RF frequency band of a mobile phone. 4 LC circuits of 3 terminal type are enclosed. It is suitable for high frequency noise filtering because of its large attenuation coefficient and deep wide noise removal band.

## 特点

- 超小型阵列产品，适用于高密度信号线。
- 在800MHz~2GHz的频带范围内具有很好的噪声衰减效果。
- 急剧的衰减特性，适用于高频信号线。
- 备有各种静电容量值的产品。
- 低静电容量型。

## Features

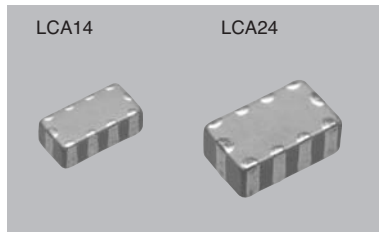
- Ultra miniature and low profile and suitable for high density circuit lines.
- Large attenuation in the frequency range 800MHz to 2GHz
- Steep insertion loss and suitable for high speed signal line.
- Products of different capacitance values are available.
- smaller capacitance

## 用途

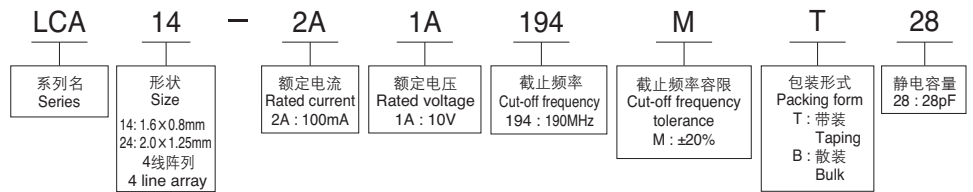
- 手机、数字影像设备

## Applications

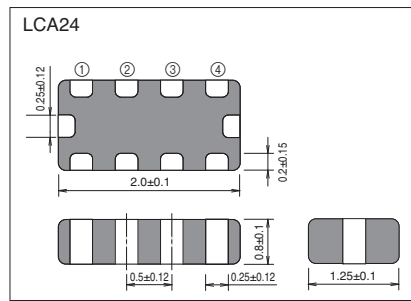
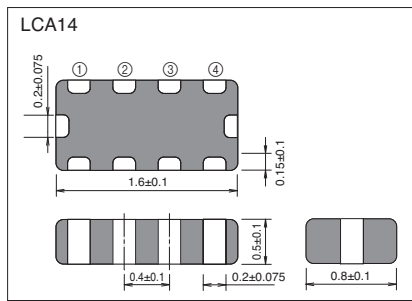
- For mobile phones and digital AV equipments



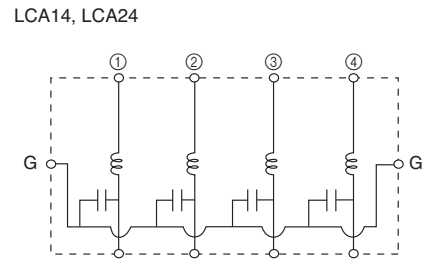
## 型号构成 Part number system



## 形状·尺寸(mm) Dimensions (mm)



## 等效电路 Equivalent circuits

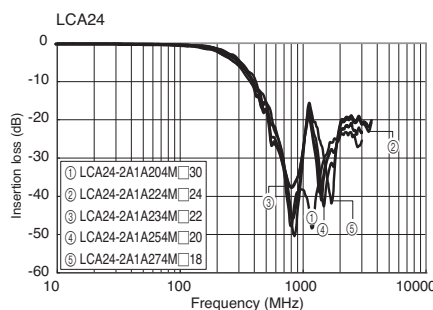
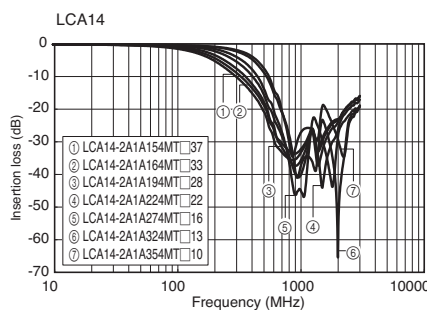


## 型号一览表 Part number list

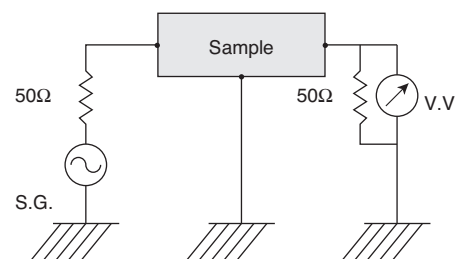
型号 Part number	截止频率 Cut-off frequency	截止频率容许偏差 Cut-off frequency tolerance	额定电压 Rated voltage	额定电流 Rated current	绝缘阻抗 Insulation Resistance	静电容量 Capacitance (参考值Reference)	使用温度范围 Operating Temp. range
LCA14-2A1A154M□37	150MHz	±20%	10V	100mA	10MΩmin.	37pF	-40°C ~ +85°C
LCA14-2A1A164M□33	160MHz					33pF	
LCA14-2A1A194M□28	190MHz					28pF	
LCA14-2A1A224M□22	220MHz					22pF	
LCA14-2A1A274M□16	270MHz					16pF	
LCA14-2A1A324M□13	320MHz					13pF	
LCA14-2A1A354M□10	350MHz					10pF	
LCA24-2A1A204M□30	200MHz					30pF	
LCA24-2A1A224M□24	220MHz					24pF	
LCA24-2A1A234M□22	230MHz					22pF	
LCA24-2A1A254M□20	250MHz					20pF	
LCA24-2A1A274M□18	270MHz					18pF	

- : T为带装, B为散装
- : "T" stands for taping package and "B" stands for bulk package.

## 插入损失特性(参考) Insertion loss (Reference)



## 电路图 Test circuit



LC复合EMI滤波器LFA14、LFA24、LFH24是复合L(电感器)和C(电容器)的高性能单片式EMI滤波器阵列。该产品采用1608、2012或2010形状，内置4个LC多级电路，是3端子型的阵列，衰减系数大、除噪频带宽，适合于抑制信号线路中的高频噪声。LFA14、LFA24、LFH24系列为分布常数电路。

Our "LFA14, LFA24, LFH24" are extremely efficient EMI filter arrays with monolithic construction of inductor and capacitor elements. They are 3 terminal arrays of 4 LC circuits in a 0603, 0805 or 0804 package, suitable for noise reduction on high frequency signal lines, due to steep and wide-band insertion loss characteristics. LFA14, LFA24 and LFH24 series have distributed element circuits.

### ■特点

- 内置4线LC多级电路，适合于高密度线路。
- 小型、薄型。
- 具有急剧的插入损失特性和宽范围的噪声吸收频带。
- LFH24为小型产品。(2.0×1.0mm)

### ■Features

- Array of 4 LC filters, suitable for high density circuit lines.
- Ultra miniature and low profile type
- Steep insertion loss characteristics and removes noise over a wide range.
- LFH24 is smaller. (0804 size)

### ■用途

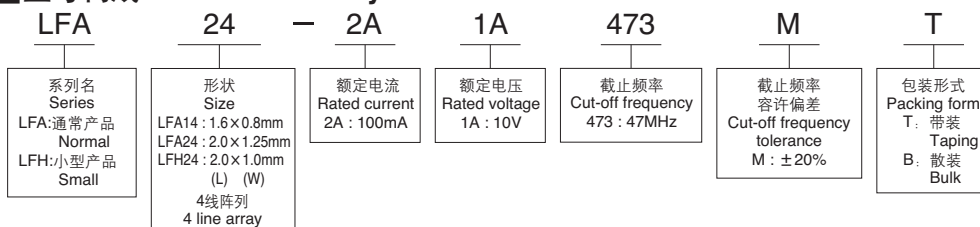
- 数字影像设备、手机

### ■Applications

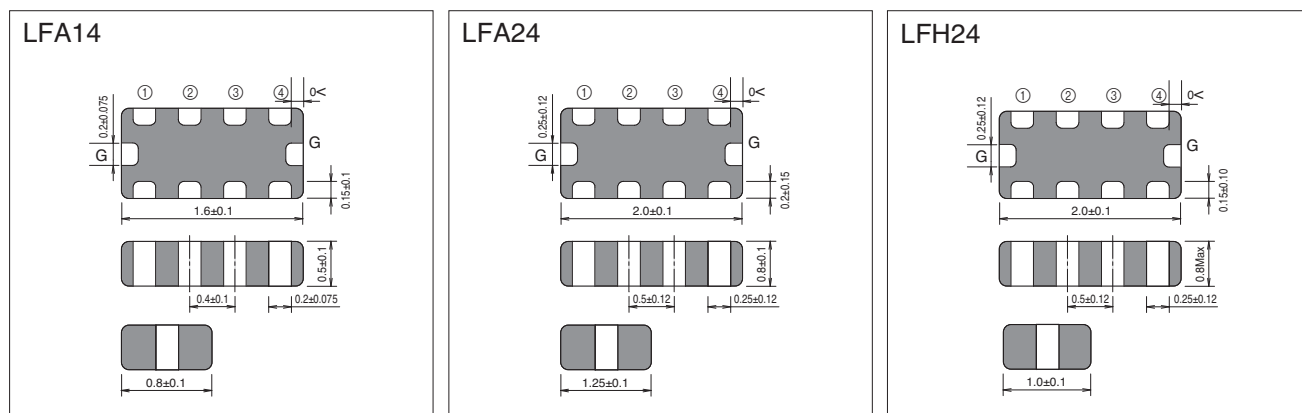
- For digital AV equipment and cellular phone.



### ■型号构成 Part number system



### ■形状·尺寸(mm) Dimensions (mm)

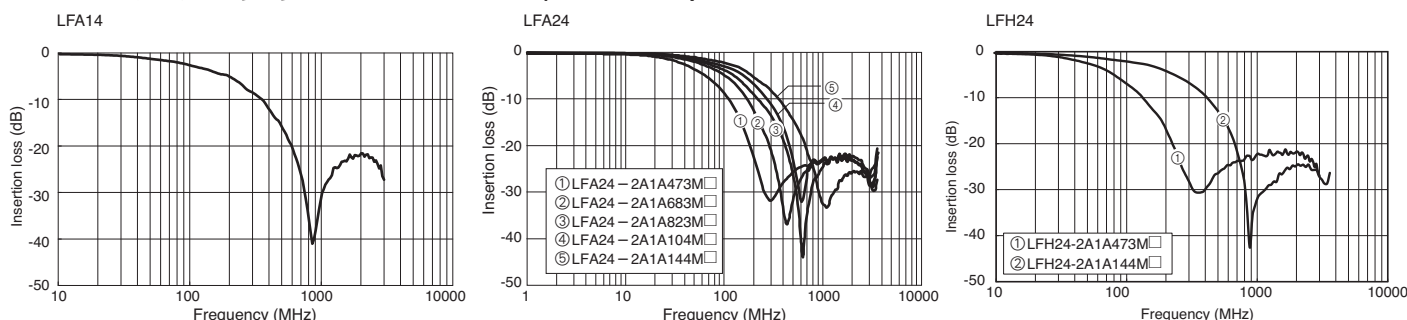


### ■型号一览表 Part number list

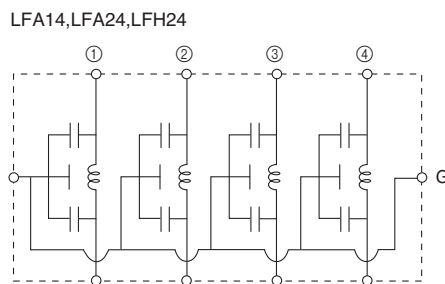
型号 Part number	截止频率 Cut-off frequency	截止频率容许偏差 Cut-off frequency tolerance	额定电压 Rated voltage	额定电流 Rated current	绝缘阻抗 Insulation Resistance	静电容量 Capacitance (参考值Reference)	使用温度范围 Operating Temp. range
LFA14-2A1A114M□	110MHz	±20%	10V	100mA	10MΩmin.	28pF	-40°C~+85°C
LFA24-2A1A473M□	47MHz					100pF	
LFA24-2A1A683M□	68MHz					55pF	
LFA24-2A1A823M□	82MHz					55pF	
LFA24-2A1A104M□	100MHz					41pF	
LFA24-2A1A144M□	140MHz					30pF	
LFH24-2A1A473M□	47MHz					100pF	
LFH24-2A1A144M□	140MHz					23pF	

□: T表示带装、B表示散装  
□: "T" stands for taping package and "B" stands for bulk package.

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



### ■等效电路 Equivalent circuits



EMI FILTER  
E-1 滤波器阵列

EMI滤波器LFB10、LFB20、LFB30产品是小型高性能EMI滤波器，用于要求大容许电流的电源线路。本产品适合于消除电源线路中的低频—高频的宽频率范围内的噪声，是3端子形状的小型表面组装元件。

Our "LFB10, LFB20, LFB30" chip type EMI filter is an extremely efficient & small EMI filter for power lines which require large rated current. They are well suited for wide range noise reduction on DC power lines.

## 特点

- 额定电流2A。
- 可消除从低频率开始的宽频率范围内的噪声。
- 小型、低高度，使用方便。

## Features

- Rated current is 2 ampere.
- Remove noise over a wide range from low frequency.
- Miniature and low profile and easy to place since there is no polarity.

## 用途

音响设备、电脑及其外围设备的DC电源线路。

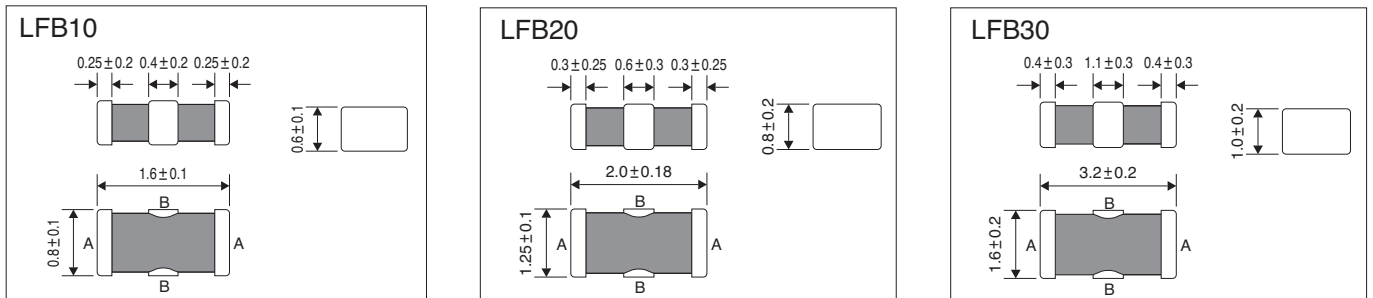
## Applications

Noise reduction of DC power lines for AV equipment, computer and computer peripheral equipment.

## 型号构成 Part number system

<b>LFB</b>	<b>20</b>	<b>-</b>	<b>3D</b>	<b>1E</b>	<b>471</b>	<b>M</b>	<b>T</b>
系列名 Series	形状 Size 10 : 1.6×0.8mm (L) (W) 20 : 2.0×1.25mm (L) (W) 30 : 3.2×1.6mm (L) (W)		额定电流 Rated current 3D : 2000mA	额定电压 Rated voltage 1E : 25V 1H : 50V	截止频率 Cut-off frequency 471 : 470KHz 561 : 560KHz	截止频率 容许偏差 Cut-off frequency tolerance M : ±20%	包装形式 Packing form T : 带装 Taping B : 散装 Bulk

## 形状·尺寸(mm) Dimensions (mm)

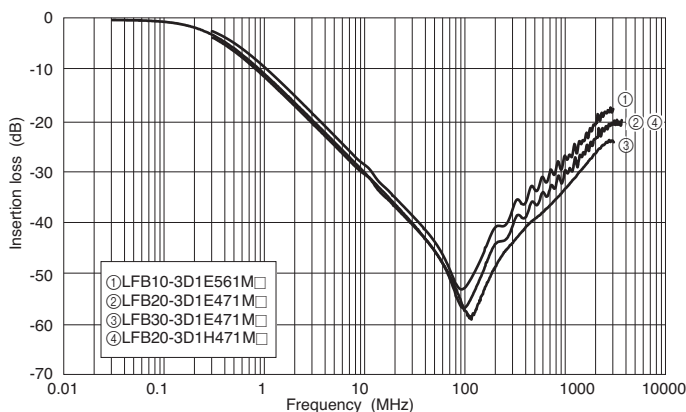


## 型号一览表 Part number list

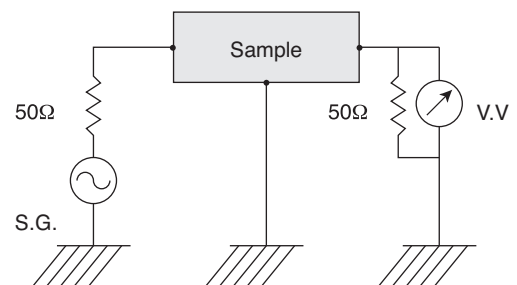
型号 Part number	截止频率 Cut-off frequency	截止频率容许偏差 Cut-off frequency tolerance	额定电压 Rated voltage	额定电流 Rated current	绝缘阻抗 Insulation Resistance	使用温度范围 Operating Temp. range
LFB10-3D1E561M□	560KHz	±20%	25V	2000mA	10MΩmin.	-40°C~+85°C
LFB20-3D1E471M□	470KHz					
LFB30-3D1E471M□						
LFB20-3D1H471M□						

□: T表示带装、B表示散装  
□: "T" stands for taping package and "B" stands for bulk package.

## 插入损失特性(参考) Insertion loss (Reference)



## 电路图 Test circuit





# LC复合EMI滤波器(LZA05)[双端子型]

# CHIP TYPE LC EMI FILTER (LZA05) [2 Terminals]

双端子型LC复合EMI滤波器LZA05是采用将电介质和磁介质复合一体化烧结而成的材料生产的高性能EMI滤波器。本滤波器利用LC共振，频率适用范围宽，是带阻型EMI滤波器，备有可选择阻带的产品系列。即使对于接地不稳定的设备、电路，也能发挥稳定的降噪效果。最适合于数字影像设备、移动设备等高速信号线路的高频降噪。

2 terminals chip type LC EMI filters LZA05 are small-sized, band stop filters with a wide selection of rejected frequency band, and shows effective noise reduction for equipment and circuits with unstable ground. They are suitable for high frequency noise reduction on high-speed signal lines of digital video equipments and mobile devices.

## 特点

- 采用电介质和磁介质一体化的单片式结构。
- 可选择噪声阻带的带阻型。
- 信号波形的失真和延迟少。
- 完全无铅产品。

## Features

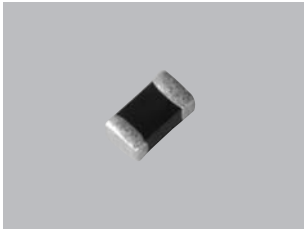
- Monolithic construction of dielectric and magnetic materials.
- Band stop filter with a choice of rejected frequency band.
- Little delay and distortion from original signal wave.
- Pb free products.

## 用途

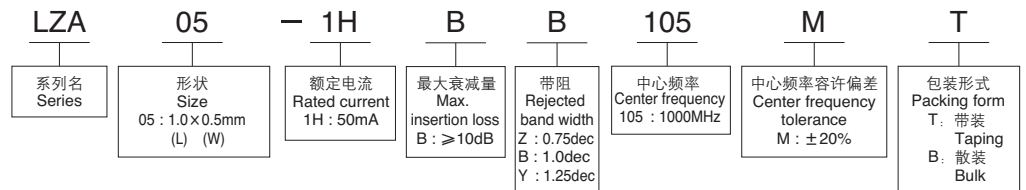
- 电视机、录像机、DVD等数字影像设备
- 手机、传真机、调制解调器、ADSL终端等信息通信设备
- 复印机、电脑、游戏机等数字设备
- 其它各种电子设备的降噪措施

## Applications

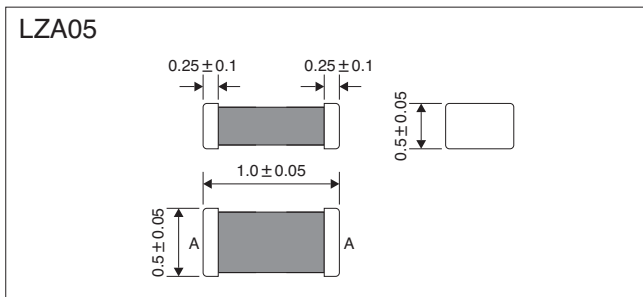
- For digital AV equipment such as TV, VCR and DVD.
- For telecommunication equipment such as cellular phone, FAX, modem and ADSL.
- For computer equipment such as personal computers and copier.
- For noise countermeasure of other digital circuit equipment.



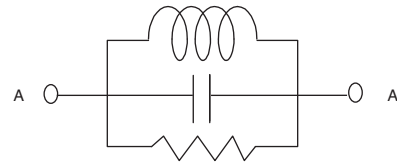
## 型号构成 Part number system



## 形状·尺寸(mm) Dimensions (mm)



## 等效电路 Equivalent circuits

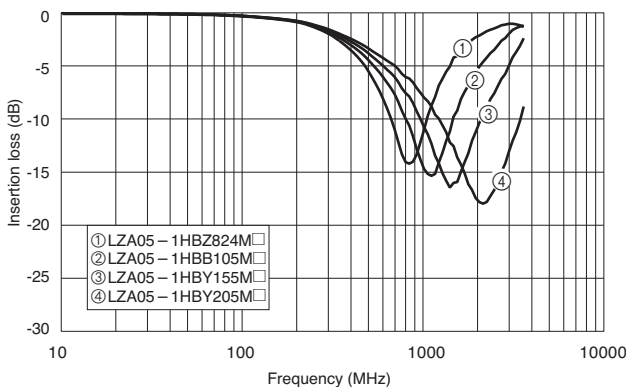


## 型号一览表 Part number list

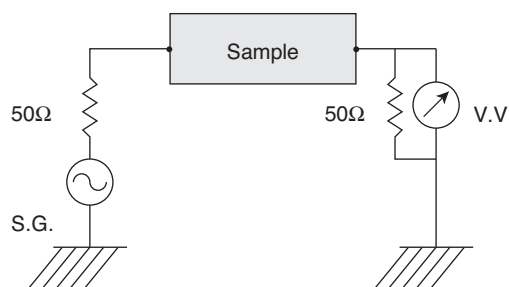
型号 Part number	中心频率 Center frequency	中心频率容许偏差 Center frequency tolerance	阻带 Rejected band width	最大衰减量 Max. insertion loss	额定电流 Rated current	使用温度范围 Operating Temp. range
LZA05 - 1HBZ824M□	820MHz	±20%	0.75dec	≥10dB	50mA	-25°C ~ +85°C
LZA05 - 1HBB105M□	1000MHz		1.0dec	≥10dB		
LZA05 - 1HBY155M□	1500MHz		1.25dec	≥10dB		
LZA05 - 1HBY205M□	2000MHz		1.25dec	≥10dB		

□: T表示带装、B表示散装  
□: "T" stands for taping package and "B" stands for bulk package.

## 插入损失特性(参考) Insertion loss (Reference)



## 电路图 Test circuit



# LC复合EMI滤波器(LZA10)[双端子型]

# CHIP TYPE LC EMI FILTER (LZA10) [2 Terminals]

双端子型LC复合EMI滤波器LZA10是采用将电介质和磁介质复合并一体化烧结而成的材料生产的高性能EMI滤波器。本滤波器利用LC共振，频率适用范围宽，是带阻型EMI滤波器，备有可选择阻带的产品系列。即使对于接地不稳定的设备、电路，也能发挥稳定的降噪效果。最适合于数字影像设备、移动设备等高速信号线路的高频降噪。

Our "LZA10" 2 terminals chip type LC EMI filter is an extremely efficient EMI filter made of a combination of both dielectric and magnetic materials. Using LC resonance, this part works as a band stop filter with a wide selection of rejected frequency band, and shows effective noise reduction for equipment and circuits with unstable ground. Suitable for high frequency noise reduction on high-speed signal lines of digital video equipment and mobile devices.

## 特点

- 采用电介质和磁介质一体化的单片式结构。
- 可选择噪声阻带的带阻型。
- 信号波形的失真和延迟少。

## Features

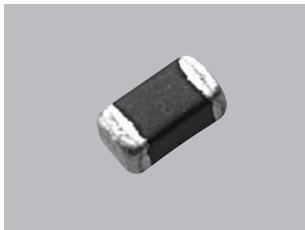
- Monolithic construction of dielectric and magnetic materials.
- Band stop filter with a choice of rejected frequency band.
- Little delay and distortion from original signal wave.

## 用途

- 电视机、录像机、DVD等数字影像设备
- 手机、传真机、调制解调器、ADSL终端等信息通信设备
- 复印机、电脑、游戏机等数字设备
- 其它各种电子设备的降噪措施

## Applications

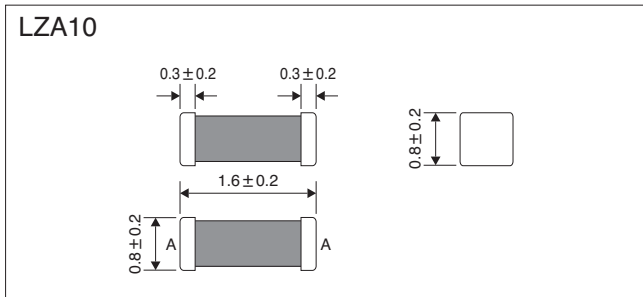
- For digital AV equipment such as TV, VCR and DVD.
- For telecommunication equipment such as cellular phone, FAX, modem and ADSL.
- For computer equipment such as personal computers and copier.
- For noise countermeasure of other digital circuit equipment.



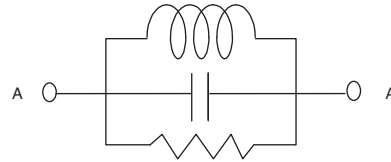
## 型号构成 Part number system

LZA	10	-	2A	C	B	104	M	T
系列名 Series	形状 Size 10 : 1.6×0.8mm (L) (W)	额定电流 Rated current 2A : 100mA	最大衰减量 Max. insertion loss C : ≥15dB D : ≥20dB	带阻 Rejected band width A : 0.5dec B : 1.0dec C : 1.5dec	中心频率 Center frequency 104 : 100MHz	中心频率容许偏差 Center frequency tolerance M : ±20%	包装形式 Packing form T : 带装 Taping B : 散装 Bulk	

## 形状·尺寸(mm) Dimensions (mm)



## 等效电路 Equivalent circuits

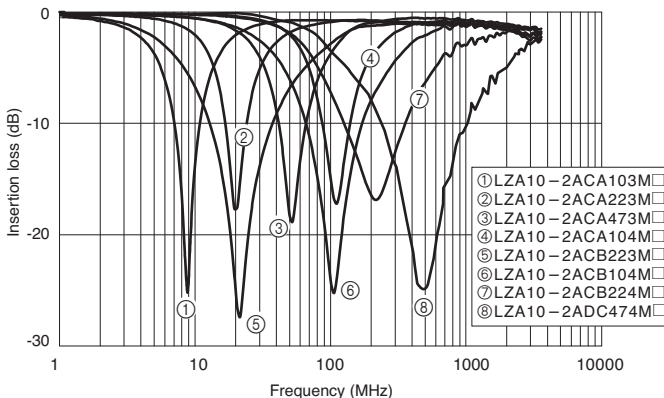


## 型号一览表 Part number list

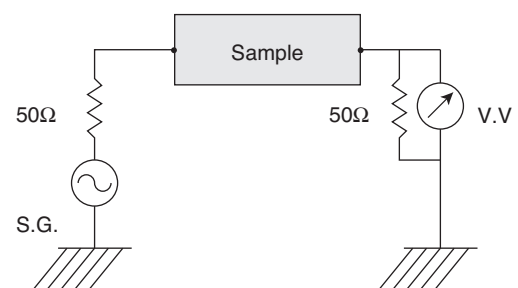
型号 Part number	中心频率 Center frequency	中心频率容许偏差 Center frequency tolerance	带阻 Rejected band width	最大衰减量 Max. insertion loss	额定电流 Rated current	使用温度范围 Operating Temp. range
LZA10-2ACA103M□	10MHz	±20%	0.5dec	≥15dB	100mA	-25°C ~ +85°C
LZA10-2ACA223M□	22MHz					
LZA10-2ACA473M□	47MHz					
LZA10-2ACA104M□	100MHz					
LZA10-2ACB223M□	22MHz		1.0 dec	≥20dB		
LZA10-2ACB104M□	100MHz					
LZA10-2ACB224M□	220MHz					
LZA10-2ADC474M□	470MHz		1.5 dec	≥20dB		

□: T表示带装、B表示散装 □: "T" stands for taping package and "B" stands for bulk package.

## 插入损失特性(参考) Insertion loss (Reference)

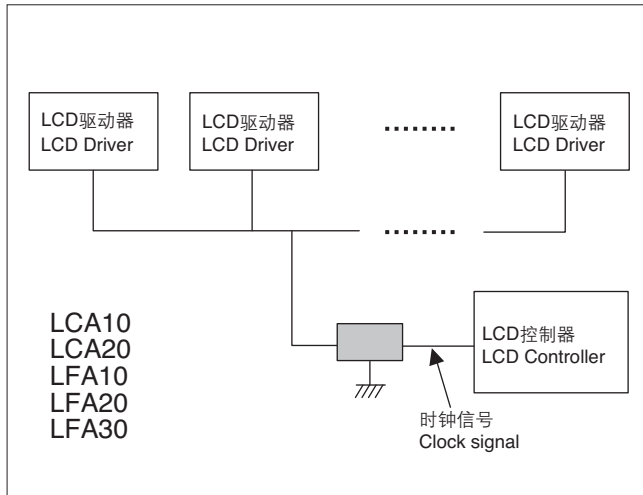


## 电路图 Test circuit



## ■ 时钟线的降噪方案

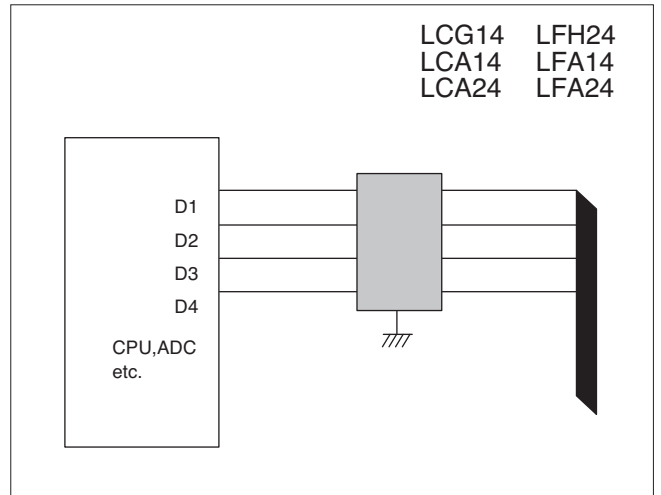
## Clock line



移动电话、液晶面板、各种数字设备  
Mobile phone, LCD panel, Digital Equipment

## ■ 数据线的降噪方案

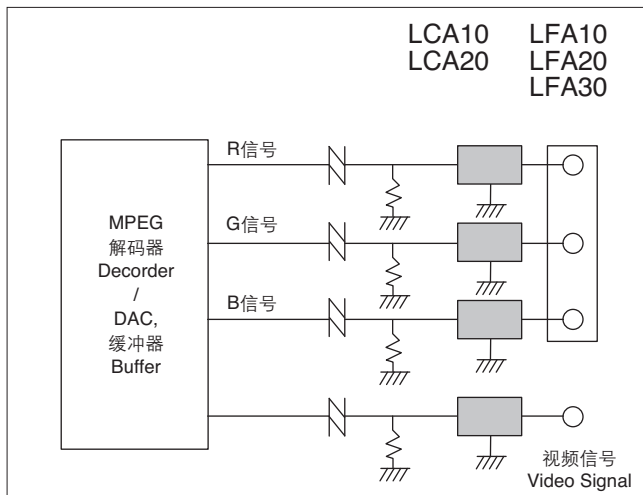
## Data line



移动电话、复印机、液晶面板、各种数字设备  
Mobile phone, Copier, LCDpanel, Digital Equipment

## ■ 视频线路的降噪方案

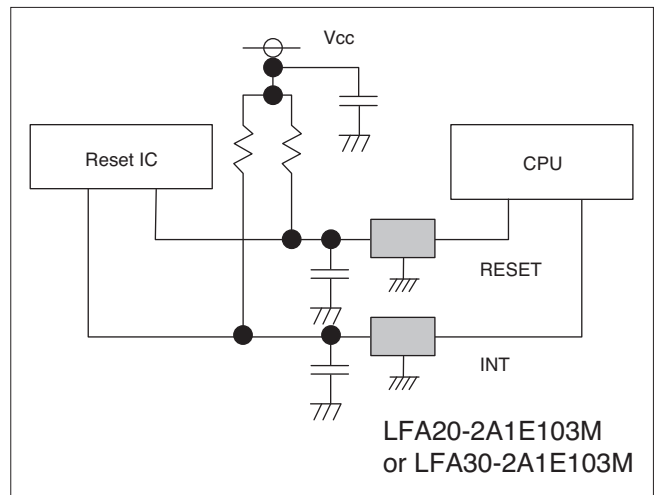
## Video signal line



PC、数字电视、游戏机、车载导航设备  
PC, Digital-TV, Game machine, Car-Navigation

## ■ EMS对策

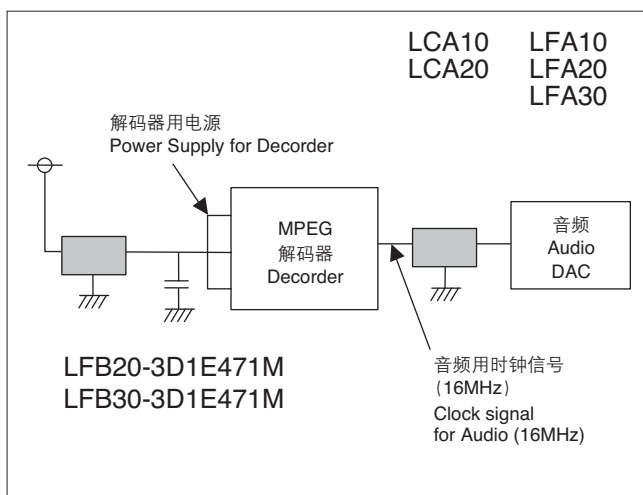
## EMS protect



游戏机、各种使用微电脑的设备  
Game machine, IC.

## ■ 电源线路的降噪方案

## Power line



IC电源线  
Vcc line for IC.

## ■ 电路设计

### 1-1. 使用环境以及额定电路、性能确认

请确认使用环境以及安装环境之后，在EMI滤波器目录或规格书中规定的额定电路、性能范围之内使用。

### 1-2. 使用电压以及电流(额定电路电压、电流的确认)

输入在EMI滤波器的电压、电流，请使用额定电压以及电流范围内的数值。输入超出额定电路电压、电流情况时，将发生劣化、损害。

### 1-3. 使用温度

请在目录或规格书中规定的范围内使用。特别是超出最高使用温度时，降低其可靠性，请勿使用。

### 1-4. 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)。

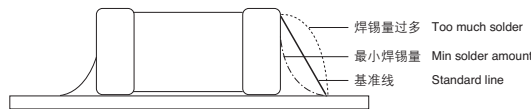
- 1) 直接接触水的场所、因湿度大可能会导致结露的场所
- 2) 有腐蚀性、还原性气体(硫化氢、亚硫酸、氯气、氨气等)的环境
- 3) 有挥发性、可燃性气体的环境
- 4) 多尘的场所
- 5) 减压或加压后的空气中
- 6) 暴露于盐水、油、药液、有机溶剂的场所
- 7) 振动或冲击过大的场所
- 8) 其他与上述环境相当的场所

### 1-5. 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。

## ■ 安装条件

- 1) 焊剂请使用低活性(卤化物含有率在0.2wt%以下)的产品。
- 2) 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
- 3) 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。请调整焊锡量，使焊缝上端的厚度为贴片厚度的1/2~2/3。



- 4) 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。
- 5) 进行主板分割时，由于制品受到机械应力的作用，故请采取适当的制品配置和分割方法。

## ■ 树脂涂层

- 1) 根据树脂的种类，在硬化过程以及自然放置下、树脂分解出来的气体停滞在树脂内，有时使产品的性能退化。
- 2) 如果树脂的硬化温度超出了产品的使用温度，更加严重受到热膨胀冷缩的影响，有时导致产品破损。
- 3) 因树脂的热膨胀冷缩的影响下，有时使产品的性能退化。

## ■ Circuit design

### 1-1. Verification of operating environment, electrical rating and performance

EMI filters shall be used within the electrical rating and characteristics specified in the specifications or catalogue.

### 1-2. Operating voltage and current (Verification of rated voltage and current)

The operating voltage and current for the EMI filters must always be lower than their rated values.

Unless the products are operated below the specified maximum rated voltage and current, it may cause damage and insulation breakdown.

### 1-3. Operating temperature

The EMI filters shall be used within the operating temperature specified in the specifications or catalogue. The reliability of the products might be reduced when the products are used in the high temperature beyond the maximum operating temperature.

### 1-4. Operating conditions

Do not use the products under the following conditions because all these factors deteriorate the performances or cause failures

- 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

### 1-5. Safety precaution

Our products shall be used for general purposes 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.

## ■ Soldering and mounting notice

- 1) Use rosin-based flux. Do not use strong acid flux with halide content over 0.2wt%.
- 2) 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
- 3) Too much soldering may cause mechanical stress resulting in cracking. The amount of solder shall be controlled as the height of fillet is 1/2 to 1/3 of the thickness of the product.

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

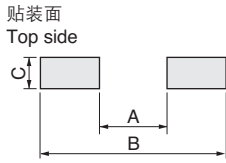
## ■ Resin coating

- 1) Decomposition gas or chemical reaction vapor of some type of resins may remain inside the resin during the hardening period or normal storage, resulting in deterioration of the performance of the products.
- 2) When a hardening temperature of resin is higher than the operating temperature, the stresses generated by the excess heat may lead to damage or destruction of the product.
- 3) Stress caused by a resin's temperature generated expansion and contraction may damage the products. The use of such resins, molding materials etc. is not recommended.

**推荐焊盘布局** Recommended land pattern.  
**基本设计** Board design

**1.LZA05, LZA10**

回流焊接 Reflow soldering

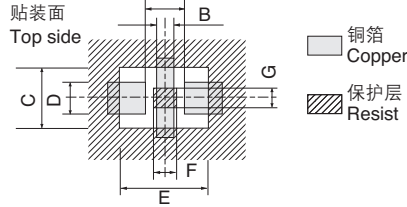


单位:mm  
Unit:mm

型号 Type	LZA05	LZA10
形状 Size	1.0×0.5	1.6×0.8
A	0.4	0.7
B	1.4	2.0
C	0.5	0.7

**2.LCA10, LFA10, LFB10**

回流焊接 Reflow soldering



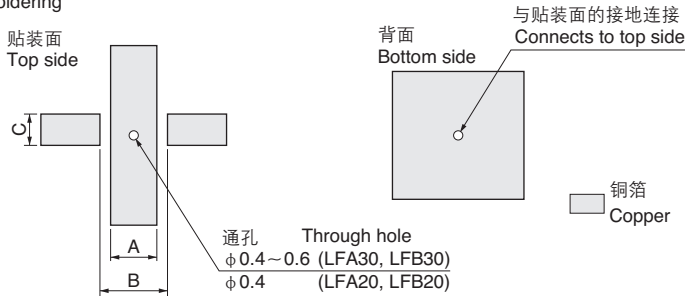
单位:mm  
Unit:mm

型号 Type	LCA10 LFA10 LFB10
形状 Size	1.6×0.8
A	1.15
B	0.45
C	1.6
D	0.8
E	2.5
F	0.6
G	0.4

建议经通孔连接到地线  
Connection to ground pattern via through hole recommended

**3.LCA20, LFA20, LFB20, LFA30, LFB30**

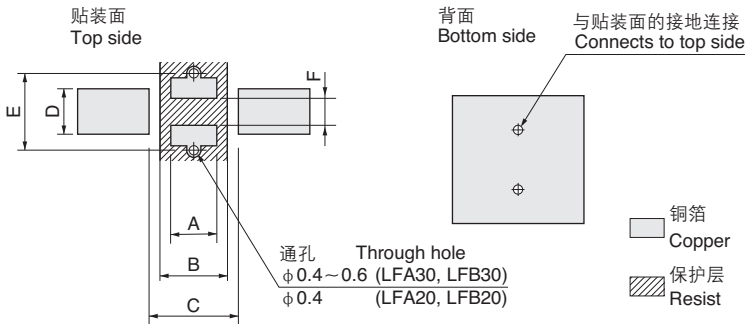
回流焊接 Reflow soldering



单位:mm  
Unit:mm

型号 Type	LCA20 LFA20 LFB20	LFA30 LFB30
形状 Size	2.0×1.25	3.2×1.6
A	0.6	1.3
B	1.5	2.3
C	1.0	1.3

流动焊接 Flow soldering

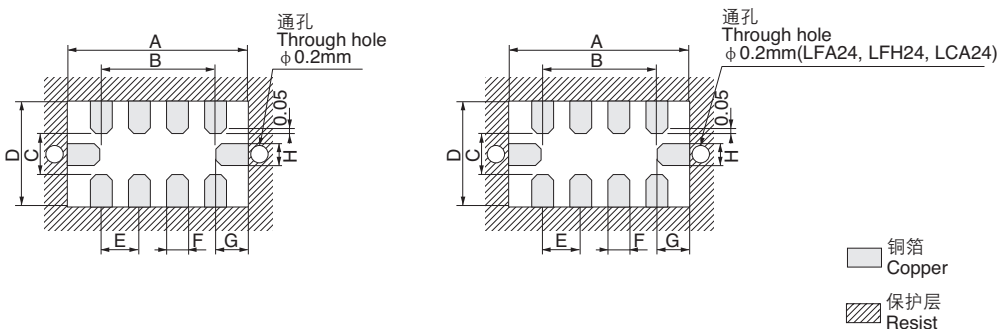


单位:mm  
Unit:mm

型号 Type	LCA20 LFA20 LFB20	LFA30 LFB30
形状 Size	2.0×1.25	3.2×1.6
A	0.6	1.3
B	0.8	1.5
C	1.5	2.3
D	1.0	1.3
E	2.2	3.0
F	0.6	0.6

**4.LFA14, LCA14, LCG14, LFA24, LFH24, LCA24**

回流焊接 Reflow soldering



单位:mm  
Unit:mm

型号 Type	LFA14 LCA14 LCG14	LFA24 LCA24	LFH24
形状 Size	1.6×0.8	2.0×1.25	2.0×1.0
A	2.2	2.6	2.6
B	1.2	1.5	1.5
C	0.5	0.75	0.63
D	1.4	1.85	1.73
E	0.4	0.5	0.5
F	0.15	0.25	0.25
G	0.5	0.55	0.55
H	0.15	0.23	0.23

# 共模滤波器(CMA12)

# COMMON MODE FILTER (CMA12)

积层型共模滤波器CMA12系列是高性能共模滤波器，可有效降低LVDS等高速差分信号传输线的共模噪声。该产品采用陶瓷结构，粘接强度高、贴装可靠性优异，适用于便携式设备等的高速差分信号传输线。

The common mode filter are highly effective to the common mode noise filtering for the differential signal lines of LVDS. It is suitable for differential signal lines of mobile equipments, because monolithic construction of ceramic realizes excellent adherence strength of terminations and high reliability in mounting.

## 特点

- 小型、超薄
- 采用陶瓷结构，粘接强度高、贴装可靠性优异。
- 适用于便携式设备等的高速差分信号传输。

## Features

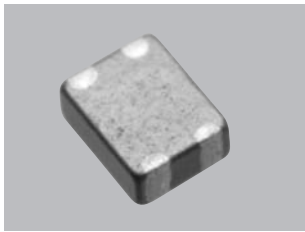
- Ultra miniature and low profile type.
- Safe ceramic construction delivers excellent adherence strength of terminations and reliability of mouting.
- Excellent for differential signal lines in mobile equipments.

## 用途

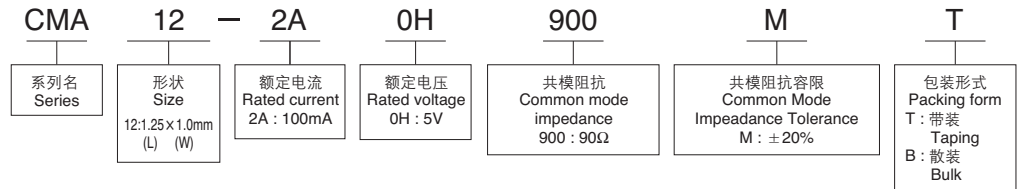
小型数字设备的USB、LVDS、IEEE1394等差分信号传输线用

## Applications

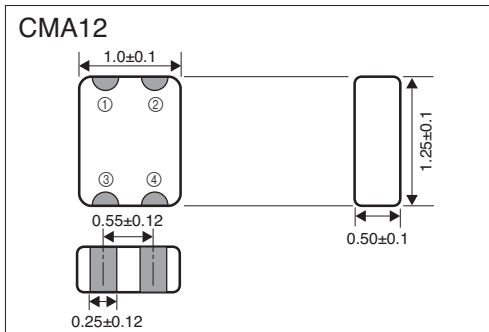
Differential signal lines for USB, LVDS or IEEE1394 used in compact dital equipment.



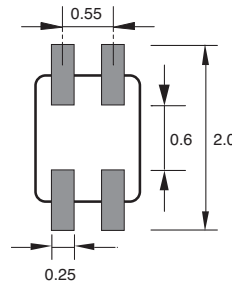
## 型号构成 Part number system



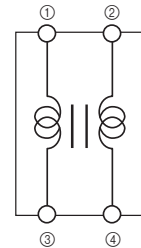
## 形状·尺寸(mm) Dimensions (mm)



## 推荐焊盘布局 Recommended Land Pattern



## 等效电路 Equivalent circuits

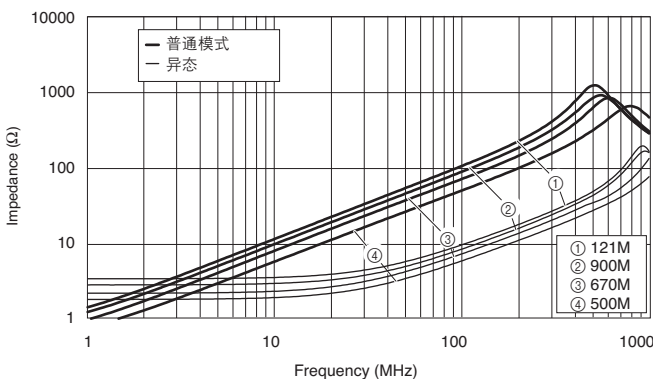


## 型号一览表 Part number list

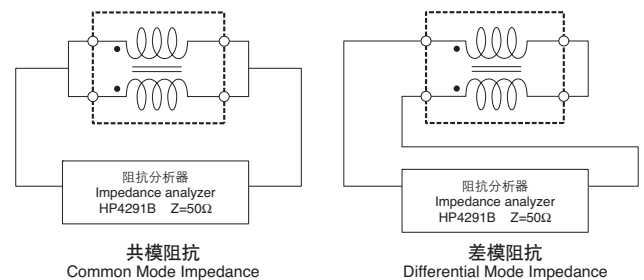
型号 Part number	共模阻抗 Common mode impedance (Ω : 100MHz)	额定电压 Rated voltage	额定电流 Rated current	绝缘电阻 Insulation Resistance	使用温度范围 Operating Temp. range	断开频率 Cut-off frequency (参考值 Reference)
CMA12-2A0H500M□	50Ω	5V	100mA	100MΩmin.	-40°C ~ +85°C	580MHz
CMA12-2A0H670M□	67Ω					530MHz
CMA12-2A0H900M□	90Ω					530MHz
CMA12-2A0H121M□	120Ω					460MHz

□ : T表示带装, B表示散装  
□ : "T" stands for taping package and "B" stands for bulk package.

## 阻抗特性(参考) Impedance Characteristics (Reference)



## 测量电路 Measuring Circuit



# 音频信号线用滤波器(CMB12)

# Audio Line FILTER (CMB12)

CMB12系列是小型、薄型的高性能滤波器，适用于移动电话及移动音响设备等音频信号线的降噪。采用全陶瓷结构，粘接强度高、贴装可靠性优异，特别适用于便携式设备的音频信号线。

The audio line filter (CMB12) are small-sized and highly effective to noise filtering for the audio lines for mobile phones and portable audio equipments. It is suitable for audio lines of mobile equipments, because monolithic construction of ceramic realizes excellent adherence strength of terminations and high reliability in mounting.

## 规格

- 形状：1210(1.25×1.0mm)
- 额定电流：500mA, 400mA, 100mA
- 额定电压：5V DC
- 开放模式阻抗：120, 150, 800, 1200Ω

## Specification

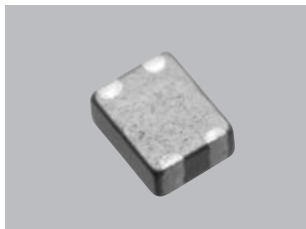
- Dimension: 1210(1.25×1.0mm)
- Rated current: 500mA, 400mA, 100mA
- Rated voltage: 5V DC
- Open mode Impedance: 120, 150, 800, 1200Ω

## 用途

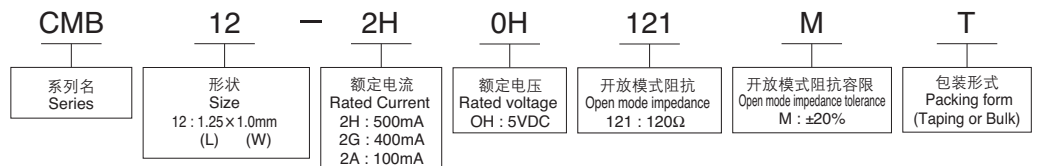
移动电话、移动音响设备等音频信号线

## Applications

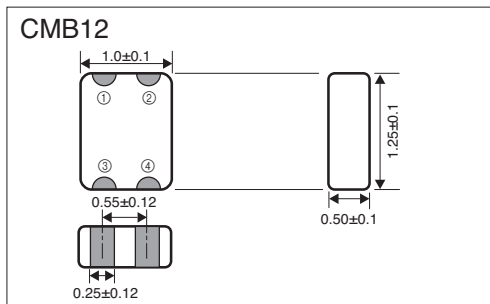
Audio lines for mobile phones and portable audio equipments.



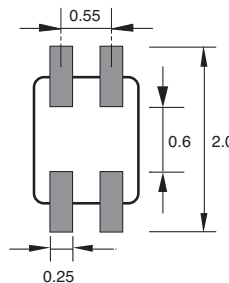
## 型号构成 Part number system



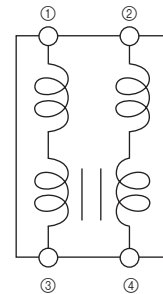
## 形状·尺寸(mm) Dimensions (mm)



## 推荐焊盘布局 Recommended Land Pattern



## 等效电路 Equivalent circuits

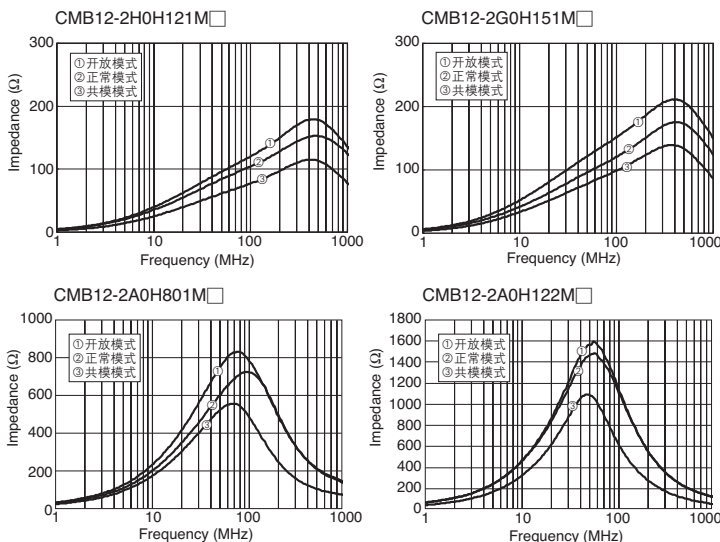


## 型号一览表 Part number list

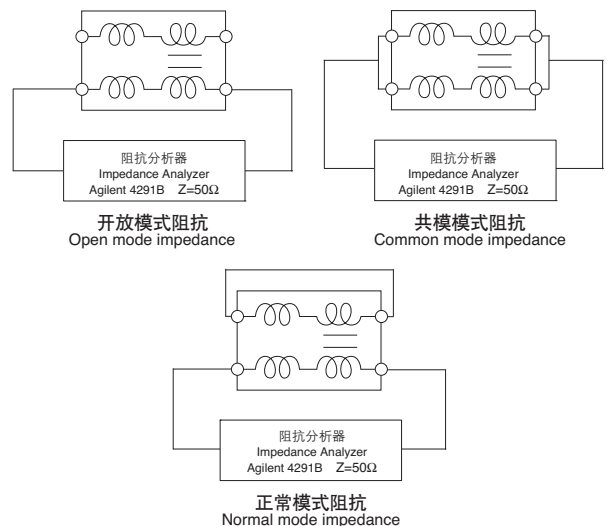
型号 Part number	开放模式阻抗 Open mode impedance (Ω:100MHz)	额定电压 Rated voltage	额定电流 Rated current	绝缘电阻 Insulation Resistance	使用温度范围 Operating Temp. range
CMB12-2H0H121M□	120Ω	5V	500mA	100MΩmin.	-40°C ~ +85°C
CMB12-2G0H151M□	150Ω		400mA		
CMB12-2A0H801M□	800Ω		100mA		
CMB12-2A0H122M□	1200Ω				

□: T表示带装, B表示散装  
□: "T" stands for taping package and "B" stands for bulk package.

## 阻抗特性(参考) Impedance Characteristics (Reference)


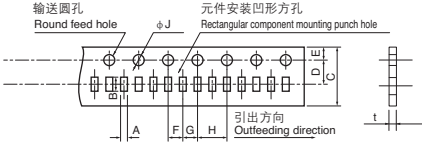
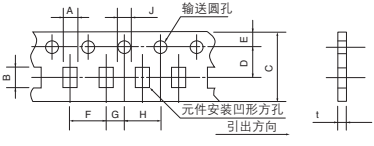
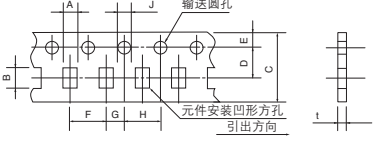
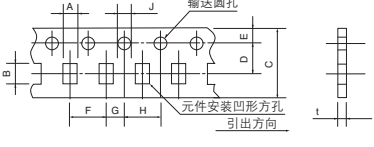
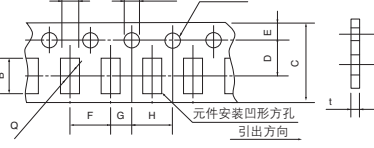
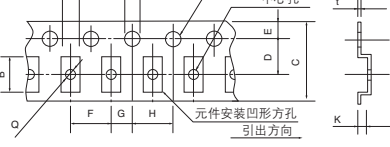
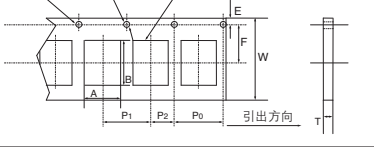
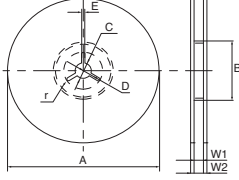


## 测量电路 Measuring Circuit



## EMI滤波器 EMI FILTERS

单位: mm  
Unit: mm

包装记号 Packing code	品种 types	包装数量 Packing Qty.	包装形式 Packing form																							
B	所有型号 All types	500	聚乙烯袋 Poly bag 																							
T	LZA05	10,000	 <table border="1" data-bbox="1040 492 1460 638"> <tr><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td></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></tr> <tr><td>F</td><td>G</td><td>H</td><td>J</td><td>t</td></tr> <tr><td>2.0 ±0.1</td><td>2.00 ±0.05</td><td>4.0 ±0.1</td><td>ø1.5 +0.1 -0</td><td>0.8以下 max</td></tr> </table>	A	B	C	D	E	0.62 ±0.10	1.15 ±0.10	8.0 ±0.3	3.50 ±0.05	1.75 ±0.10	F	G	H	J	t	2.0 ±0.1	2.00 ±0.05	4.0 ±0.1	ø1.5 +0.1 -0	0.8以下 max			
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	0.62 ±0.10	1.15 ±0.10	8.0 ±0.3	3.50 ±0.05	1.75 ±0.10																					
	F	G	H	J	t																					
	2.0 ±0.1	2.00 ±0.05	4.0 ±0.1	ø1.5 +0.1 -0	0.8以下 max																					
	LCA10 LFA10 LFA14 LCA14 LCG14 LFB10	4,000	 <table border="1" data-bbox="1040 672 1460 817"> <tr><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td></tr> <tr><td>1.00 ±0.05</td><td>1.8 ±0.05</td><td>8.0 ±0.2</td><td>3.50 ±0.05</td><td>1.75 ±0.1</td></tr> <tr><td>F</td><td>G</td><td>H</td><td>J</td><td>t</td></tr> <tr><td>4.0 ±0.1</td><td>2.00 ±0.05</td><td>4.0 ±0.1</td><td>1.50<sup>+0.1</sup><sub>-0</sub></td><td>0.7 ±0.1</td></tr> </table>	A	B	C	D	E	1.00 ±0.05	1.8 ±0.05	8.0 ±0.2	3.50 ±0.05	1.75 ±0.1	F	G	H	J	t	4.0 ±0.1	2.00 ±0.05	4.0 ±0.1	1.50 <sup>+0.1</sup> <sub>-0</sub>	0.7 ±0.1			
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F	G	H	J	t																						
4.0 ±0.1	2.00 ±0.05	4.0 ±0.1	1.50 <sup>+0.1</sup> <sub>-0</sub>	0.7 ±0.1																						
LZA10	4,000	 <table border="1" data-bbox="1040 851 1460 996"> <tr><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td></tr> <tr><td>0.95 ±0.2</td><td>1.8 ±0.2</td><td>8.0 ±0.3</td><td>3.50 ±0.05</td><td>1.75 ±0.1</td></tr> <tr><td>F</td><td>G</td><td>H</td><td>J</td><td>t</td></tr> <tr><td>4.0 ±0.1</td><td>2.00 ±0.05</td><td>4.0 ±0.1</td><td>1.50<sup>+0.1</sup><sub>-0</sub></td><td>1.1以下 max</td></tr> </table>	A	B	C	D	E	0.95 ±0.2	1.8 ±0.2	8.0 ±0.3	3.50 ±0.05	1.75 ±0.1	F	G	H	J	t	4.0 ±0.1	2.00 ±0.05	4.0 ±0.1	1.50 <sup>+0.1</sup> <sub>-0</sub>	1.1以下 max				
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LCA20 LFA20 LFB20 LFA24 LCA24	4,000	 <table border="1" data-bbox="1040 1030 1460 1176"> <tr><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td></tr> <tr><td>1.62 ±0.2</td><td>2.4 ±0.2</td><td>8.0 ±0.3</td><td>3.5 ±0.05</td><td>1.75 ±0.1</td></tr> <tr><td>F</td><td>G</td><td>H</td><td>J</td><td>t</td></tr> <tr><td>4.0 ±0.1</td><td>2.0 ±0.05</td><td>4.0 ±0.1</td><td>1.50<sup>+0.1</sup><sub>-0</sub></td><td>1.05 ±0.1</td></tr> </table>	A	B	C	D	E	1.62 ±0.2	2.4 ±0.2	8.0 ±0.3	3.5 ±0.05	1.75 ±0.1	F	G	H	J	t	4.0 ±0.1	2.0 ±0.05	4.0 ±0.1	1.50 <sup>+0.1</sup> <sub>-0</sub>	1.05 ±0.1				
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LFH24	4,000	 <table border="1" data-bbox="1040 1209 1460 1355"> <tr><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td></tr> <tr><td>1.20 ±0.08</td><td>2.20 ±0.08</td><td>8.0 ±0.2</td><td>3.50 ±0.05</td><td>1.75 ±0.10</td></tr> <tr><td>F</td><td>G</td><td>H</td><td>J</td><td>t</td></tr> <tr><td>4.0 ±0.1</td><td>2.00 ±0.05</td><td>4.0 ±0.1</td><td>1.50<sup>+0.1</sup><sub>-0</sub></td><td>1.00 ±0.10</td></tr> </table>	A	B	C	D	E	1.20 ±0.08	2.20 ±0.08	8.0 ±0.2	3.50 ±0.05	1.75 ±0.10	F	G	H	J	t	4.0 ±0.1	2.00 ±0.05	4.0 ±0.1	1.50 <sup>+0.1</sup> <sub>-0</sub>	1.00 ±0.10				
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LFA30 LFB30	2,000	 <table border="1" data-bbox="1040 1388 1460 1534"> <tr><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td></tr> <tr><td>1.9 ±0.2</td><td>3.5 ±0.2</td><td>8.0 ±0.3</td><td>3.5 ±0.05</td><td>1.75 ±0.1</td><td>4.0 ±0.1</td></tr> <tr><td>G</td><td>H</td><td>J</td><td>K</td><td>t</td><td>Q</td></tr> <tr><td>2.0 ±0.05</td><td>4.0 ±0.1</td><td>1.55 ±0.1</td><td>1.20 ±0.2</td><td>0.25 ±0.05</td><td>1.15 ±0.05</td></tr> </table>	A	B	C	D	E	F	1.9 ±0.2	3.5 ±0.2	8.0 ±0.3	3.5 ±0.05	1.75 ±0.1	4.0 ±0.1	G	H	J	K	t	Q	2.0 ±0.05	4.0 ±0.1	1.55 ±0.1	1.20 ±0.2	0.25 ±0.05	1.15 ±0.05
A	B	C	D	E	F																					
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2.0 ±0.05	4.0 ±0.1	1.55 ±0.1	1.20 ±0.2	0.25 ±0.05	1.15 ±0.05																					
CMA12 CMB12	4,000	 <table border="1" data-bbox="1040 1568 1460 1713"> <tr><td>A</td><td>B</td><td>W</td><td>F</td><td>E</td></tr> <tr><td>1.20 ±0.2</td><td>1.45 ±0.05</td><td>8.0 ±0.2</td><td>3.50 ±0.05</td><td>1.75 ±0.10</td></tr> <tr><td>P<sub>1</sub></td><td>P<sub>2</sub></td><td>P<sub>0</sub></td><td>D<sub>0</sub></td><td>T</td></tr> <tr><td>4.0 ±0.1</td><td>2.00 ±0.05</td><td>4.0 ±0.1</td><td>ø1.5<sup>+0.1</sup><sub>-0</sub></td><td>0.68 ±0.05</td></tr> </table>	A	B	W	F	E	1.20 ±0.2	1.45 ±0.05	8.0 ±0.2	3.50 ±0.05	1.75 ±0.10	P <sub>1</sub>	P <sub>2</sub>	P <sub>0</sub>	D <sub>0</sub>	T	4.0 ±0.1	2.00 ±0.05	4.0 ±0.1	ø1.5 <sup>+0.1</sup> <sub>-0</sub>	0.68 ±0.05				
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4.0 ±0.1	2.00 ±0.05	4.0 ±0.1	ø1.5 <sup>+0.1</sup> <sub>-0</sub>	0.68 ±0.05																						
所有型号 All types			 <table border="1" data-bbox="909 1736 1460 1848"> <tr><th>记号Code</th><th>A</th><th>B</th><th>C</th><th>D</th><th>E</th><th>W<sub>1</sub></th><th>W<sub>2</sub></th><th>r</th></tr> <tr><td>RRM08B</td><td>ø180<sup>+0</sup><sub>-3</sub></td><td>ø60<sup>+0</sup><sub>-0</sub></td><td>ø13.0 ±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>	记号Code	A	B	C	D	E	W <sub>1</sub>	W <sub>2</sub>	r	RRM08B	ø180 <sup>+0</sup> <sub>-3</sub>	ø60 <sup>+0</sup> <sub>-0</sub>	ø13.0 ±0.2	R10.5 ±0.4	2.0 ±0.5	9.0 ±0.3	11.4 ±1.0	0.5					
记号Code	A	B	C	D	E	W <sub>1</sub>	W <sub>2</sub>	r																		
RRM08B	ø180 <sup>+0</sup> <sub>-3</sub>	ø60 <sup>+0</sup> <sub>-0</sub>	ø13.0 ±0.2	R10.5 ±0.4	2.0 ±0.5	9.0 ±0.3	11.4 ±1.0	0.5																		

EMI滤波器  
EMI FILTER



## 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 melt 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	形状 Type	端子电极 Termination	使用温度范围 Operating temperature range	电阻值范围 Resistance range	页码 Page		
新产品 TZ05	贴片式热敏电阻 SMD chip	镀锡 Tin plating	-40°C ~ +150°C	10kΩ	57		
新产品 TD05, TD11				10kΩ ~ 100kΩ	57		
新产品 TX05				10kΩ	58		
TS03, TC03, TH03			-40°C ~ +100°C		-40°C ~ +125°C	25Ω ~ 100kΩ	58,62
TN05, TC05, TH05						30Ω ~ 2MΩ	58,61
TN11, TH11						2kΩ ~ 1MΩ	59,60
TN10, TC10						30Ω ~ 150kΩ	61
TN20, TC20, TH20			40Ω ~ 2MΩ	59,60			
MN18, MH18			圆板型热敏电阻 MELF	镀锡 Tin plating	-40°C ~ +150°C	2kΩ ~ 150kΩ	65
FH05, FH10			薄片式热敏电阻 Flake chip	金电极 Au Electrode	-40°C ~ +125°C	10kΩ, 100kΩ	64
CN25, CH25	径向引脚型热敏电阻 Radial leaded	无铅焊接涂层铜镍合金线 Pb-free soldered Cu-Ni wire	-40°C ~ +110°C	500Ω ~ 500kΩ	66,71		
RM16, RH16		聚氨酯被覆线 Polyurethane covered wire		1kΩ ~ 100kΩ	67,71		
BN35		PVC被覆线 PVC covered wire	-20°C ~ 80°C	10kΩ ~ 2.2MΩ	71		
新产品 BM22, BM38		聚氨酯被覆线 Polyurethane covered wire	-40°C ~ +100°C	10kΩ	71		
新产品 BF05		10kΩ		71			
GR15, GR25		杜美丝 Dumet wire	-40°C ~ +300°C (+150°C)	2kΩ ~ 10MΩ	68,71		
DC30		无铅焊接涂层铜镍合金线 Pb-free soldered Cu-Ni wire	-40°C ~ +100°C	300Ω ~ 200kΩ	67		
GA13, GH13	轴向引脚型热敏电阻 Axial leaded	镀镍或镀锡 Ni-plating or Tin plating	-40°C ~ +300°C (+150°C)	2kΩ ~ 100kΩ	69,72		
GA20, GH20				2kΩ ~ 100kΩ	69,72		

## 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表示25°C时的电阻值, 前2位为电阻值的有效数字, 第3位为有效数字后的零的个数。单位为Ω。  
Resistance value at 25°C 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

标记 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	$\begin{matrix} \text{===== } \pm 1\% \text{ =====} \\ = \pm 0.3\% = & & \text{===== } \pm 3\% \text{ =====} \\ & & \text{===== } \pm 5\% \text{ =====} \end{matrix}$						

记号 Code	包装形式 Packing form	包装数量 Packing Qty.	相应品种 Related series
B	散装 Bulk	500	TS03, TC03, TH03, TN05, TC05, TH05, TN10, TC10, TN11, TH11 TZ05, TX05, TD05, TD11, TN20, TC20, TH20
		200	MN18, MH18, GA13, GH13, GA20, GH20 CN25, CH25, RM16, RH16, GR15
		100	DC30, GR25
C	塑料盘装 Plastic tray	400	FH05, FH10
T	纸带装 Paper taping	4,000	TD11, TN11, TH11, TN10, TC10, TN20, TC20, TH20
P	塑料带装 Plastic taping	2,000	MN18, MH18
F	扁平包装 Flat pack	2,000	GA13, GH13, GA20, GH20, DC30
R	纸带装 Paper taping	10,000	TZ05, TX05, TD05, TN05, TC05, TH05
D		15,000	TS03, TC03, TH03

NTC THERMISTOR  
热敏电阻

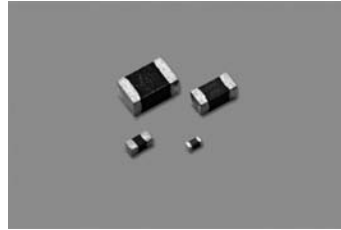
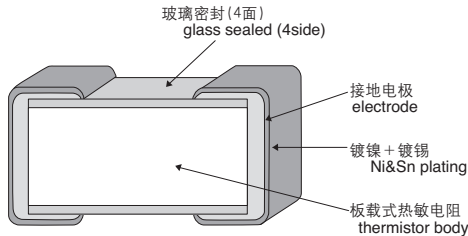
## 表面贴装型

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.

## ■ 结构及外观 Structure and appearance



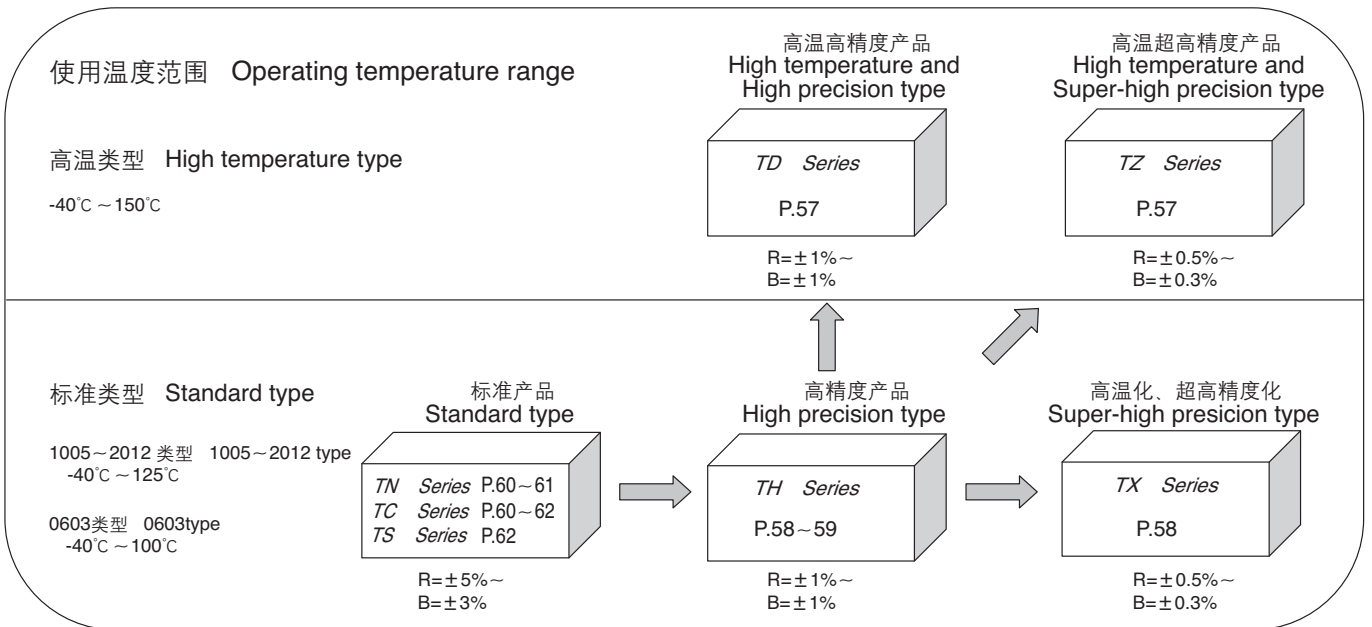
## ■ 特点

- 通过独自的原材料, 实现超高精度的温度测量
- 通过独自的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°C高温
- 完全不含铅(Pb)产品
- RoHS指定产品

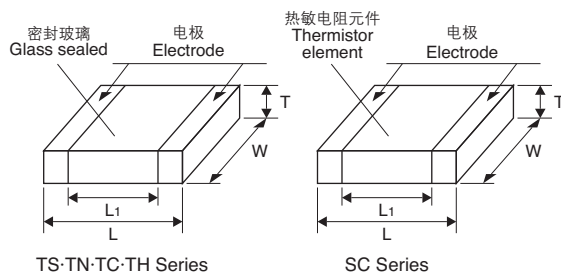
## ■ Features

- 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°C)
- Lead-free
- RoHS Compliance

## ■ 产品系列 Product lineup



## ■ 形状·尺寸 Dimensions



系列 Series	L	W	T	L <sub>1</sub>
TS03·TC03·TH03	0.60±0.04	0.30±0.04	0.30±0.04	0.10min.
TZ·TX·TD05 TN·TC·TH	1.00±0.15	0.50 <sup>+0.05</sup> <sub>-0.10</sub>	0.50 <sup>+0.05</sup> <sub>-0.10</sub>	0.20min.
TN·TC	1.60±0.15	0.80±0.15	0.95max.	0.30min.
TD11·TN·TH11	1.60±0.15	0.80±0.15	0.70max.	0.30min.
TN·TC·TH20	2.00±0.20	1.25±0.20	1.25max.	0.40min.

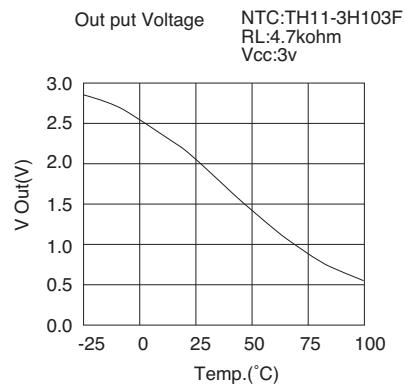
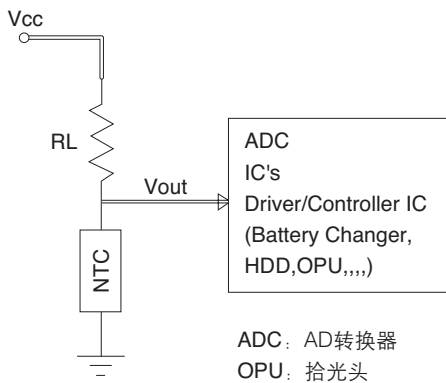
## ■用途

- 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
- 光通信用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

## ■Applications

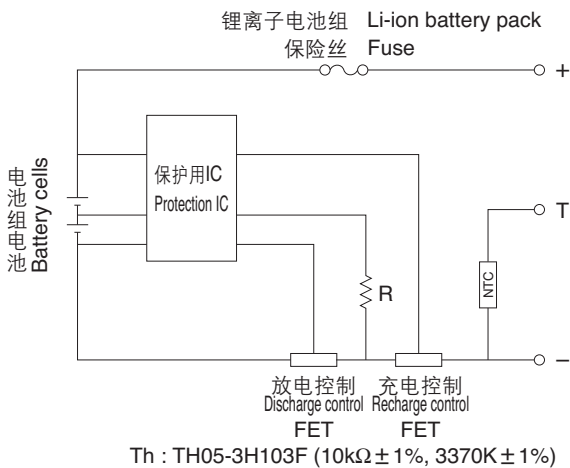
- Temperature compensated circuit in HDD
- Optical pickup for CD/DVD writing,
- CPU periphery temperature monitoring circuits,
- Temperature detection for DC power supply
- Gain Stabilization for mobile phone
- Temperature compensation of display contrast in LCD
- Temperature detection of battery cells
- 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

## ■温度检测回路 Temperature detection circuit



## ■典型用途 Typical Applications

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



[高温超高精度产品]

TZ05系列

- 形状·尺寸 ..... 1.0×0.5×0.55max (mm)  
(参见形状·尺寸表)
- 电阻值容许偏差 ..... ±0.5%, ±1% (R25)
- B值容许偏差 ..... ±0.3% (R25/R50)
- 端子电极 ..... 镀锡
- 使用温度范围 ..... -40°C~+150°C
- 散热系数 ..... 2.4mW/°C
- 最大功率 ..... 300mW

■特点

- 实现超高精度的电阻值±0.5%容许偏差、B定数0.3%容许偏差。
- 可用于-40°C~+150°C高温范围内。
- 元件表面玻璃密封，可靠性高。
- 优异的静电放电耐压性能。

■特性 Characteristics

TZ05系列 TZ05 Series

型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value
3H103**	10kΩ	3,380K	3,423K

※上表以外的特殊规格请垂询。  
※Please consult us for availability of non-standard items.

[高温超高精度产品]

TD05系列

- 形状·尺寸 ..... 1.0×0.5×0.55max (mm)  
(参见形状·尺寸表)
- 电阻值容许偏差 ..... ±1%, ±2%, ±3% (R25)
- B值容许偏差 ..... ±1%, ±2% (R25/50)
- 端子电极 ..... 镀锡
- 使用温度范围 ..... -40°C~+150°C
- 散热系数 ..... 2.4mW/°C
- 最大功率 ..... 300mW

TD11系列

- 形状·尺寸 ..... 1.6×0.8×0.70max (mm)  
(参见形状·尺寸表)
- 电阻值容许偏差 ..... ±1%, ±2%, ±3% (R25)
- B值容许偏差 ..... ±1%, ±2% (R25/50)
- 端子电极 ..... 镀锡
- 使用温度范围 ..... -40°C~+150°C
- 散热系数 ..... 3.0mW/°C
- 最大功率 ..... 375mW

■特点

- 可用于-40°C~+150°C高温范围内。
- 实现高精度电阻值、B常数±1%容许偏差。
- 优异的静电放电耐压性能。
- 最适用于发动机控制电路、DC/DC变频器。
- 元件表面玻璃密封，可靠性高。

■特性 Characteristics

TD05系列 TD05 Series

型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value
3H103**	10kΩ	3,370K	3,413K
3L104**	100kΩ	3,540K	3,587K

TD11系列 TD11 Series

型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value
3H103**	10kΩ	3,370K	3,423K
4H104**	100kΩ	4,360K	4,360K
新产品 3S224**	220kΩ	3,760K	3,806K
新产品 3W474**	470kΩ	3,940K	3,998K

※上表以外的特殊规格请垂询。  
※Please consult us for availability of non-standard items.

[High temperature, super-high precision type]

TZ05 Series

- Dimensions ..... 1.0×0.5×0.55max(mm)
- Resistance tolerance ..... ±0.5%, ±1% (R25)
- B value tolerance ..... ±0.3% (R25/R50)
- Termination ..... Tin plating
- Operating temperature range ..... -40°C~+150°C
- Heat dissipation ..... 2.4mW/°C
- Maximum power dissipation ..... 300mW

■Features

- High precision type.(±0.3%)
- Suitable for wide operating temperature rang.(-40°C~+150°C)
- Glass sealed body for high reliability
- Strong against electrostatic discharge.

[High Temperature, high precision type]

TD05 Series

- Dimensions ..... 1.0×0.5×0.55max(mm)
- Resistance tolerance ..... ±1%, ±2%, ±3% (R25)
- B value tolerance ..... ±1%, ±2% (R25/50)
- Termination ..... Tin plating
- Operating temperature range ..... -40°C~+150°C
- Heat dissipation ..... 2.4mW/°C
- Maximum power dissipation ..... 300mW

TD11 Series

- Dimensions ..... 1.6×0.8×0.70max(mm)
- Resistance tolerance ..... ±1%, ±2%, ±3% (R25)
- B value tolerance ..... ±1%, ±2% (R25/50)
- Termination ..... Tin plating
- Operating temperature range ..... -40°C~+150°C
- Heat dissipation ..... 3.0mW/°C
- Maximum power dissipation ..... 375mW

■Features

- Suitable for wide operating temperature rang.(-40°C~+150°C)
- High precision type.(±1%)
- Strong against electrostatic discharge.
- Suitable for engine control circuit and DC/DC converter.
- Glass sealed body for high reliability.

## [超高精度产品]

### TX05系列

- 形状·尺寸 ..... 1.0×0.5×0.55max (mm)  
(参见形状·尺寸表)
- 电阻值容许偏差 ..... ±0.5%, ±1%(R25)
- B值容许偏差 ..... ±0.3% (R25/R50)
- 端子电极 ..... 镀锡
- 使用温度范围 ..... -40°C~+125°C
- 散热系数 ..... 2.4mW/°C
- 最大功率 ..... 240mW

### ■特点

- 实现超高精度的电阻值±0.5%容许偏差, B定数0.3%容许偏差。
- 元件表面全部玻璃密封, 可靠性高。
- 静电放电耐压性能优异。

## ■特性 Characteristics

TX05系列 型号 Type	TX05 Series 电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value
3H103**	10kΩ	3,380K	3,423K

※上表以外的特殊规格请垂询。  
※Please consult us for availability of non-standard items.

## [超高精度产品]

### TH03系列

- 形状·尺寸 ..... 0.6×0.3×0.34max (mm)  
(参见形状·尺寸表)
- 电阻值容许偏差 ..... ±3%(R25)
- B值容许偏差 ..... ±1% (B25/50)
- 端子电极 ..... 镀锡
- 使用温度范围 ..... -40°C~+100°C
- 散热系数 ..... 1.5mW/°C
- 最大功率 ..... 110mW

## ■特性 Characteristics

TH03系列 型号 Type	TH03 Series 电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value
3H103**	10kΩ	3,370K	3,413K
4B104**	100kΩ	4,030K	4,073K

### TH05系列

- 形状·尺寸 ..... 1.0×0.5×0.55max (mm)  
(参见形状·尺寸表)
- 电阻值容许偏差 ..... ±1%, ±2%, ±3% (R25)
- B值容许偏差 ..... ±1%, ±2% (B25/50)
- 端子电极 ..... 镀锡
- 使用温度范围 ..... -40°C~+125°C
- 散热系数 ..... 2.4mW/°C
- 最大功率 ..... 240mW

### ■特点

- 超小型。
- 电阻值精度高, B值的容许偏差为±1%。
- 静电放电耐压性能优异。
- 最适用于锂离子、镍氢等电池组。
- 元件表面全部玻璃密封, 可靠性高。

## ■特性

### TH05系列

型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value	型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value
3H103**	10kΩ	3,370K	3,413K	3L104**	100kΩ	3,540K	3,578K
3T103**	10kΩ	3,820K	3,792K	4F104**	100kΩ	4,250K	4,254K
3I473**	47kΩ	3,400K	3,490K	3M154**	150kΩ	3,620K	3,668K
4B473**	47kΩ	4,050K	4,057K	4K474H*	470kΩ	4,500K	4,541K

※关于R-T数据, 请参阅本公司主页。

## [Super-high precision type]

### TX05 Series

- Dimensions ..... 1.0×0.5×0.55max (mm)
- Resistance tolerance ..... ±0.5%, ±1%(R25)
- B value tolerance ..... ±0.3%(R25/R50)
- Termination ..... Tin plating
- Operating temperature range ..... -40°C~+125°C
- Heat dissipation ..... 2.4mW/°C
- Maximum power dissipation ..... 240mW

### ■Features

- High precision type.(±0.3%)
- Glass sealed body for high reliability
- Strong against electrostatic discharge.

## [High precision type]

### TH03 Series

- Dimensions ..... 0.6×0.3×0.34max (mm)
- Resistance tolerance ..... ±3%(R25)
- B value tolerance ..... ±1%(B25/50)
- Termination ..... Tin plating
- Operating temperature range ..... -40°C~+100°C
- Heat dissipation ..... 1.5mW/°C
- Maximum power dissipation ..... 110mW

### TH05 Series

- Dimensions ..... 1.0×0.5×0.55max (mm)
- Resistance tolerance ..... ±1%, ±2%, ±3%(R25)
- B value tolerance ..... ±1%, ±2%(B25/50)
- Termination ..... Tin plating
- Operating temperature range ..... -40°C~+125°C
- Heat dissipation ..... 2.4mW/°C
- Maximum power dissipation ..... 240mW

### ■Features

- Ultra small size.
- High precision type.(±1%)
- Strong against electrostatic discharge.
- Suitable for battery pack application.(Li-ion, Ni-MH etc)
- Glass sealed body for high reliability.

## ■Characteristics

### TH05 Series

## [高精度产品]

### TH11系列

- 形状·尺寸 ..... 1.6×0.8×0.70max (mm)  
(参见形状·尺寸表)
- 电阻值容许偏差 ..... ±1%, ±2%, ±3% (R25)
- B值容许偏差 ..... ±1%, ±2% (B25/50)
- 端子电极 ..... 镀锡
- 使用温度范围 ..... -40°C~+125°C
- 散热系数 ..... 3.0mW/°C
- 最大功率 ..... 300mW

### ■特点

- 电阻值精度高, B值的容许偏差为±1%。
- 静电放电耐压性能优异。
- 最适用于锂离子、镍氢等电池组。
- 元件表面全部玻璃密封, 可靠性高。

### ■特性

#### TH11系列

型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value
3H103**	10kΩ	3,370K	3,423K
3V103**	10kΩ	3,910K	3,876K
4C153**	15kΩ	4,110K	4,053K
3T223**	22kΩ	3,820K	3,841K
3K333**	33kΩ	3,480K	3,617K
3J473**	47kΩ	3,440K	3,481K
4B473**	47kΩ	4,050K	4,067K

※关于R-T数据, 请参阅本公司主页。

## [High precision type]

### TH11 Series

- Dimensions ..... 1.6×0.8×0.70max (mm)
- Resistance tolerance ..... ±1%, ±2%, ±3%(R25)
- B value tolerance ..... ±1%, ±2%(B25/50)
- Termination ..... Tin plating
- Operating temperature range ..... -40°C~+125°C
- Heat dissipation ..... 3.0mW/°C
- Maximum power dissipation ..... 300mW

### ■Features

- High precision type.(±1%)
- Strong against electrostatic discharge.
- Suitable for battery pack application.(Li-ion, Ni-MH etc)
- Glass sealed body for high reliability.

### ■Characteristics

#### TH11 Series

型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value
3K683**	68kΩ	3,500K	3,534K
3M104**	100kΩ	3,590K	3,628K
4H104**	100kΩ	4,360K	4,360K
3R154**	150kΩ	3,680K	3,723K
3S224**	220kΩ	3,760K	3,806K
3U334**	330kΩ	3,850K	3,904K
3W474**	470kΩ	3,940K	3,998K
4V105G*	1MΩ	4,900K	4,909K

※Regarding R-T data, please refer to our Home Page.

### TH20系列

- 形状·尺寸 ..... 2.0×1.25×1.25max (mm)  
(参见形状·尺寸表)
- 电阻值容许偏差 ..... ±1%, ±2%, ±3% (R25)
- B值容许偏差 ..... ±1%, ±2% (B25/50)
- 端子电极 ..... 镀锡
- 使用温度范围 ..... -40°C~+125°C
- 散热系数 ..... 5.0mW/°C
- 最大功率 ..... 500mW

### ■特点

- 电阻值精度高, B值的容许偏差为±1%。
- 静电放电耐压性能优异。
- 最适用于锂离子、镍氢等电池组。
- 元件表面全部玻璃密封, 可靠性高。

### ■特性

#### TH20系列

型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value
3H103**	10kΩ	3,370K	3,489K
3V103**	10kΩ	3,924K	3,914K
3W303**	30kΩ	3,950K	3,991K
3M503**	50kΩ	3,590K	3,628K

※关于R-T数据, 请参阅本公司主页。

### TH20 Series

- Dimensions ..... 2.0×1.25×1.25max (mm)
- Resistance tolerance ..... ±1%, ±2%, ±3%(R25)
- B value tolerance ..... ±1%, ±2%(B25/50)
- Termination ..... Tin plating
- Operating temperature range ..... -40°C~+125°C
- Heat dissipation ..... 5.0mW/°C
- Maximum power dissipation ..... 500mW

### ■Features

- High precision type.(±1%)
- Strong against electrostatic discharge.
- Suitable for battery pack application.(Li-ion, Ni-MH etc)
- Glass sealed body for high reliability.

### ■Characteristics

#### TH20 Series

型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value
3W503**	50kΩ	3,950K	4,030K
3R803**	80kΩ	3,700K	3,743K
3S104**	100kΩ	3,760K	3,806K

※Regarding R-T data, please refer to our Home Page.

## [通用产品]

### TN·TC20系列

- 形状·尺寸 ..... 2.0×1.25×1.25max (mm)  
(参见形状·尺寸表)
- 电阻值容许偏差 ..... ±5%, ±10% (R25)
- B值容许偏差 ..... ±3%, ±5% (B25/50)
- 端子电极 ..... 镀锡
- 使用温度范围 ..... -40°C~+125°C
- 散热系数 ..... 5.0mW/°C
- 最大功率 ..... 500mW

### ■特点

- 低容量, 适用于TCXO。
- 可对应高B值(TC20系列)。
- 元件表面玻璃密封, 可靠性高。
- 产品系列齐全, 可适应各种用途需要。

### ■特性 Characteristics

#### TN20系列 TN20 Series

型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value	型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value
2N680**	68Ω	2,650K	2,673K	3H103**	10kΩ	3,370K	3,489K
2S101**	100Ω	2,750K	2,758K	3V103**	10kΩ	3,924K	3,914K
2T151**	150Ω	2,800K	2,813K	3N153**	15kΩ	3,650K	3,695K
2V221**	220Ω	2,900K	2,917K	3S223**	22kΩ	3,750K	3,786K
3A331**	330Ω	3,000K	3,019K	3W303**	30kΩ	3,950K	3,991K
3C471**	470Ω	3,100K	3,120K	3T333**	33kΩ	3,800K	3,839K
3E681**	680Ω	3,200K	3,218K	3U473**	47kΩ	3,850K	3,894K
3E102**	1kΩ	3,200K	3,221K	3W503**	50kΩ	3,950K	4,030K
3I152**	1.5kΩ	3,400K	3,403K	3N683**	68kΩ	3,650K	3,690K
3K202**	2kΩ	3,500K	3,469K	3R803**	80kΩ	3,700K	3,743K
3S332**	3.3kΩ	3,750K	3,731K	4C104**	100kΩ	4,100K	4,141K
3W472**	4.7kΩ	3,950K	3,909K	4D154**	150kΩ	4,150K	4,195K
4C682**	6.8kΩ	4,100K	4,044K	5A205**	2MΩ	5,000K	5,043K

※关于R-T数据, 请参阅本公司主页。 ※Regarding R-T data, please refer to our Home Page.

#### TC20系列 TC20 Series

型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value	型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value
2S400**	40Ω	2,750K	2,758K	4C302**	3.0kΩ	4,100K	4,044K

※关于R-T数据, 请参阅本公司主页。 ※Regarding R-T data, please refer to our Home Page.

### TN11系列

- 形状·尺寸 ..... 1.6×0.8×0.70max (mm)  
(参见形状·尺寸表)
- 电阻值容许偏差 ..... ±5%, ±10% (R25)
- B值容许偏差 ..... ±3% (B25/50)
- 端子电极 ..... 镀锡
- 使用温度范围 ..... -40°C~+125°C
- 散热系数 ..... 3.0mW/°C
- 最大功率 ..... 300mW

### ■特点

- 小型、薄型。
- 低容量, 适用于TCXO。
- 元件表面玻璃密封, 可靠性高。
- 产品系列齐全, 可适应各种用途需要。

### ■特性

#### TN11系列

型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value	型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value
3I202**	2kΩ	3,400K	3,399K	3K683**	68kΩ	3,500K	3,534K
3H103**	10kΩ	3,370K	3,423K	3M104**	100kΩ	3,590K	3,628K
3V103**	10kΩ	3,910K	3,876K	4H104**	100kΩ	4,360K	4,360K
4C153**	15kΩ	4,110K	4,053K	3R154**	150kΩ	3,680K	3,723K
3T223**	22kΩ	3,820K	3,841K	3S224**	220kΩ	3,760K	3,806K
3K333**	33kΩ	3,480K	3,617K	3U334**	330kΩ	3,850K	3,904K
3J473**	47kΩ	3,440K	3,481K	3W474**	470kΩ	3,940K	3,998K
4B473**	47kΩ	4,050K	4,067K				

※关于R-T数据, 请参阅本公司主页。 ※Regarding R-T data, please refer to our Home Page.

## [Standard type]

### TN-TC20 Series

- Dimensions ..... 2.0×1.25×1.25max (mm)
- Resistance tolerance ..... ±5%, ±10%(R25)
- B value tolerance ..... ±3%, ±5%(B25/50)
- Termination ..... Tin plating
- Operating temperature range ..... -40°C~+125°C
- Heat dissipation ..... 5.0mW/°C
- Maximum power dissipation ..... 500mW

### ■Features

- Suitable for TCXO applications because of the low capacitance.
- High B value available.(TC20 Series)
- Glass sealed body for high reliability.
- Full lineup for various applications.

### ■Characteristics

#### TN11 Series

### TN11 Series

- Dimensions ..... 1.6×0.8×0.70max (mm)
- Resistance tolerance ..... ±5%, ±10%(R25)
- B value tolerance ..... ±3% (B25/50)
- Termination ..... Tin plating
- Operating temperature range ..... -40°C~+125°C
- Heat dissipation ..... 3.0mW/°C
- Maximum power dissipation ..... 300mW

### ■Features

- Small and thin size.
- Suitable for TCXO applications because of the low capacitance.
- Glass sealed body for high reliability.
- Full lineup for various applications.

### ■Characteristics

#### TN11 Series

[通用产品]

TN·TC10系列

- 形状·尺寸 ..... 1.6×0.8×0.95max (mm)  
(参见形状·尺寸表)
- 电阻值容许偏差 ..... ±5%, ±10% (R25)
- B值容许偏差 ..... ±3%, ±5% (B25/50)
- 端子电极 ..... 镀锡
- 使用温度范围 ..... -40°C~+125°C
- 散热系数 ..... 3.0mW/°C
- 最大功率 ..... 300mW

■特点

- 低容量, 适用于TCXO。
- 可对应高B值(TC10系列)。
- 元件表面玻璃密封, 可靠性高。
- 产品系列齐全, 可适应各种用途需要。

■特性 Characteristics

TN10系列 TN10 Series

型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value	型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value
2D300**	30Ω	2,150K	2,155K	3K222**	2.2kΩ	3,500K	3,499K
2H680**	68Ω	2,350K	2,380K	3N332**	3.3kΩ	3,650K	3,633K
2R101**	100Ω	2,700K	2,724K	3S472**	4.7kΩ	3,750K	3,750K
2S121**	120Ω	2,750K	2,769K	3V682**	6.8kΩ	3,900K	3,868K
2T151**	150Ω	2,800K	2,813K	4C103**	10kΩ	4,100K	4,048K
2V221**	220Ω	2,900K	2,901K	3U153**	15kΩ	3,850K	3,870K
3A331**	330Ω	3,000K	3,025K	3K223**	22kΩ	3,500K	3,643K
3C471**	470Ω	3,100K	3,125K	3J333**	33kΩ	3,450K	3,494K
3D681**	680Ω	3,150K	3,181K	3K473**	47kΩ	3,500K	3,537K
3F102**	1kΩ	3,250K	3,260K	3M683**	68kΩ	3,600K	3,645K
3I152**	1.5kΩ	3,400K	3,399K	3R104**	100kΩ	3,700K	3,743K
				3S154**	150kΩ	3,750K	3,797K

※关于R-T数据, 请参阅本公司主页。

※Regarding R-T data, please refer to our Home Page.

TC10系列 TC10 Series

型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value	型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value
2R820**	82Ω	2,700K	2,724K	3K182**	1.8kΩ	3,500K	3,499K
2S101**	100Ω	2,750K	2,769K	4C202**	2kΩ	4,100K	4,048K
2V181**	180Ω	2,900K	2,901K	4C302**	3kΩ	4,100K	4,048K

※关于R-T数据, 请参阅本公司主页。

※Regarding R-T data, please refer to our Home Page.

TN·TC05系列

- 形状·尺寸 ..... 1.0×0.5×0.55max (mm)  
(参见形状·尺寸表)
- 电阻值容许偏差 ..... ±5%, ±10% (R25)
- B值容许偏差 ..... ±3% (B25/50)
- 端子电极 ..... 镀锡
- 使用温度范围 ..... -40°C~+125°C
- 散热系数 ..... 2.4mW/°C
- 最大功率 ..... 240mW

■特点

- 超小型。
- 低容量, 适用于TCXO。
- 可对应高B值(TC05系列)。
- 元件表面玻璃密封, 可靠性高。
- 产品系列齐全, 可适应各种用途需要。

■特性 Characteristics

TN05系列 TN05 Series

型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value	型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value
3C102**	1.0kΩ	3,110K	3,124K	3V223**	22kΩ	3,900K	3,898K
3E152**	1.5kΩ	3,200K	3,214K	3N333**	33kΩ	3,650K	3,725K
3G222**	2.2kΩ	3,290K	3,298K	4B473**	47kΩ	4,050K	4,057K
3H302**	3.0kΩ	3,370K	3,375K	3I473**	47kΩ	3,400K	3,490K
3I332**	3.3kΩ	3,420K	3,425K	3J683**	68kΩ	3,450K	3,492K
3L472**	4.7kΩ	3,530K	3,528K	3K803**	80kΩ	3,500K	3,543K
3N682**	6.8kΩ	3,670K	3,657K	3L104**	100kΩ	3,540K	3,578K
3H103**	10kΩ	3,370K	3,413K	3M154**	150kΩ	3,620K	3,668K
3T103**	10kΩ	3,820K	3,792K	4W205**	2MΩ	4,950K	4,984K
4B153**	15kΩ	4,030K	3,985K				

※关于R-T数据, 请参阅本公司主页。

※Regarding R-T data, please refer to our Home Page.

TC05系列 TC05 Series

型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value	型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value
2S300**	30Ω	2,750K	2,769K	2S151**	150Ω	2,750K	2,769K
2S400**	40Ω	2,750K	2,769K	4C202**	2.0kΩ	4,100K	4,048K
2S680**	68Ω	2,750K	2,769K	4C272**	2.7kΩ	4,100K	4,048K
2S820**	82Ω	2,750K	2,769K	4C302**	3.0kΩ	4,100K	4,048K
2S101**	100Ω	2,750K	2,769K	4C332**	3.3kΩ	4,100K	4,048K
2S121**	120Ω	2,750K	2,769K	4K224**	220kΩ	4,500K	4,541K

※关于R-T数据, 请参阅本公司主页。

※Regarding R-T data, please refer to our Home Page.

[Standard type]

TN·TC10 Series

- Dimensions ..... 1.6×0.8×0.95max (mm)
- Resistance tolerance ..... ±5%, ±10%(R25)
- B value tolerance ..... ±3%, ±5%(B25/50)
- Termination ..... Tin plating
- Operating temperature range ..... -40°C~+125°C
- Heat dissipation ..... 3.0mW/°C
- Maximum power dissipation ..... 300mW

■Features

- Suitable for TCXO applications because of the low capacitance.
- High B value available.(TC10 Series)
- Glass sealed body for high reliability.
- Full lineup for various applications.

TN·TC05 Series

- Dimensions ..... 1.0×0.5×0.55max (mm)
- Resistance tolerance ..... ±5%, ±10%(R25)
- B value tolerance ..... ±3% (B25/50)
- Termination ..... Tin plating
- Operating temperature range ..... -40°C~+125°C
- Heat dissipation ..... 2.4mW/°C
- Maximum power dissipation ..... 240mW

■Features

- Ultra small size.
- Suitable for TCXO applications because of the low capacitance.
- High B value available.(TC05 Series)
- Glass sealed body for high reliability.
- Full lineup for various applications.



## [通用产品]

### TS·TC03系列

- 形状·尺寸 ..... 0.6×0.3×0.34max (mm)  
(参见形状·尺寸表)
- 电阻值容许偏差 ..... ±5%, ±10% (R25)
- B值容许偏差 ..... ±3% (B25/50)
- 端子电极 ..... 镀锡
- 使用温度范围 ..... -40°C~+100°C
- 散热系数 ..... 1.5mW/°C
- 最大功率 ..... 110mW

### ■特点

- 尺寸为0.6×0.3mm的超小型。
- 可对应高B值。
- 元件表面玻璃密封，可靠性高。

### ■特性 Characteristics

#### TC03系列 TC03 Series

型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	值 B25/85 B Value	型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value
3H103J	10kΩ	3,370K	3,413K	4B104**	100kΩ	4,030K	4,073K

#### TS03系列 TS03 Series

型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	值 B25/85 B Value	型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value
2S250**	25Ω	2,750K	2,754K	4K202**	2.0kΩ	4,500K	4,481K
2S300**	30Ω	2,750K	2,754K	4K302**	3.0kΩ	4,500K	4,481K

※关于R-T数据，请参阅本公司主页。  
※上表以外的特殊规格请垂询。

※Regarding R-T data, please refer to our Home Page.  
※Please consult us for availability of non-standard items.

## [Standard type]

### TS·TC03 Series

- Dimensions ..... 0.6×0.3×0.34max(mm)
- Resistance tolerance ..... ±5%, ±10%(R25)
- B value tolerance ..... ±3%(B25/50)
- Termination ..... Tin plating
- Operating temperature range ..... -40°C~+100°C
- Heat dissipation ..... 1.5mW/°C
- Maximum power dissipation ..... 110mW

### ■Features

- Ultra small size(0.6×0.3mm)
- Corresponding to the high B value
- Glass sealed body for high reliability

## 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

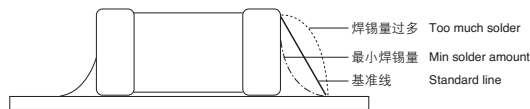
医疗、宇航、核电等设备上使用的电子部件，与用于一般民用设备的相比，常常要求更高的可靠性，因为这些设备一旦发生故障，经常会导致人身伤害或引起巨大的社会损失。考虑用于此类用途时，请务必事先与本公司联系。

### ■保存环境

- 1) 保存温度、湿度  
环境温度：-10~40°C  
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。请调整焊锡量，使焊缝上端的厚度为贴片厚度的1/2~2/3。



- 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

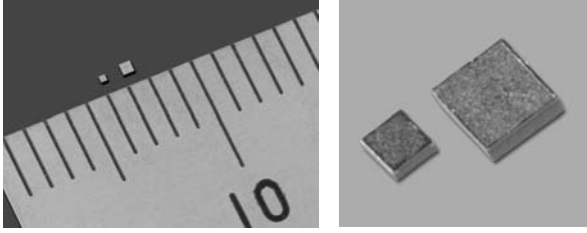
- 1) Use recommended dimensions of lands and the dimensions shall be symmetrical.
- 2) Use rosin-based flux. Do not use strong acid flux with halide content over 0.2wt%.
- 3) Do not use ultrasonic cleaning with too much output to avoid deteriorating the strength of the terminal electrodes or cracking 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.

- 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.

## FH05、FH10系列



- 电阻值容许偏差 .....  $\pm 1\%$ ,  $\pm 2\%$ ,  $\pm 3\%$  (R25)
  - B值容许偏差 .....  $\pm 1\%$  (B25/50)
  - 端子电极 ..... 金
  - 使用温度范围 .....  $-40^{\circ}\text{C} \sim +125^{\circ}\text{C}$
  - 散热系数 ..... FH05:  $0.15\text{mW}/^{\circ}\text{C}$ , FH10:  $0.3\text{mW}/^{\circ}\text{C}$
  - 最大功率 ..... FH05:  $15\text{mW}$ , FH10:  $30\text{mW}$
- ※散热常数、最大功率是钎焊 $\phi 0.1\text{mm}$  CuNi线状态下的值。

### 特点

- 小型、高精度。
- 可靠性持久。
- 可焊性与粘合性优异。
- 金锡焊接贴装时的稳定性优异。(约 $300^{\circ}\text{C}$ )

### 特性 Characteristics

#### FH05、FH10系列 FH05,10 Series

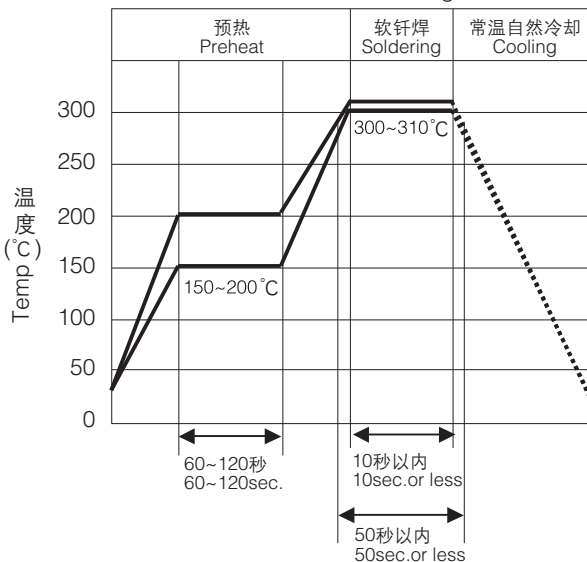
系列 Series	型号 Type	电阻值 Resistance R25	电阻值容许偏差 Resistance Tolerance			B值 B25/50 B Value
			$\pm 1\%$	$\pm 2\%$	$\pm 3\%$	
FH05	FH05-6D103*C	10k $\Omega$	○	○	○	3,930K
FH10	FH10-6E103*C	10k $\Omega$	○	○	○	3,950K
	FH10-6Q103*C	10k $\Omega$	○	○	○	3,410K
	FH10-3U104*C	100k $\Omega$	○	○	○	3,950K

※关于R-T数据, 请参阅本公司主页。

※Regarding R-T data, please refer to our Home Page.

### 推荐的钎焊条件 Recommended Soldering Profile

FH系列Au/Sn钎焊安装  
FH Series Au/Sn Solder mounting



钎焊: Au/Sn(80/20)预制 Solder: Au/Sn(80/20) preform  
环境: N<sub>2</sub>(O<sub>2</sub>:50ppm以内) Atmosphere: N<sub>2</sub> gases (O<sub>2</sub>:50ppm or less)

- 1) 保持时间为元件表面温度达到以上温度后的时间。
  - 2) 超过 $280^{\circ}\text{C}$  的温度时, 必须在50秒以内。
  - 3) 钎焊后应慢冷却, 不可快速冷却。
- 1) Time shown in the above figures is measured from the point when chip surface reaches temperature.
  - 2) Please keep exposure to temperature exceeding  $280^{\circ}\text{C}$  to under 50seconds.
  - 3) After soldering, do not force cool, allow the parts to cool gradually.

[通用产品]  
MN18系列



- 电阻值容许偏差 .....  $\pm 3\%$ ,  $\pm 5\%$  (R25)
- B值容许偏差 .....  $\pm 3\%$  (B25/50)
- 端子电极 ..... 镀锡
- 使用温度范围 .....  $-40^{\circ}\text{C}\sim+150^{\circ}\text{C}$
- 散热系数 .....  $2.0\text{mW}/^{\circ}\text{C}$
- 最大功率 .....  $250\text{mW}$

■特点

- 可在高温下使用。
- 耐环境性能优异。

■特性 Characteristics

MN18系列 MN18 Series

型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value	型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value
3G202**	2k $\Omega$	3,470K	3,507K	6E203**	20k $\Omega$	3,965K	4,016K
3G302**	3k $\Omega$	3,470K	3,507K	6P303**	30k $\Omega$	3,948K	3,984K
3G502**	5k $\Omega$	3,470K	3,507K	6H503**	50k $\Omega$	3,770K	3,820K
3H103**	10k $\Omega$	3,465K	3,502K	3U104**	100k $\Omega$	3,965K	4,038K
				3U154**	150k $\Omega$	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 Home Page.

MH18系列

- 电阻值容许偏差 .....  $\pm 1\%$ ,  $\pm 2\%$ ,  $\pm 3\%$  (R25)
- B值容许偏差 .....  $\pm 1\%$  (B25/50)
- 端子电极 ..... 镀锡
- 使用温度范围 .....  $-40^{\circ}\text{C}\sim+150^{\circ}\text{C}$
- 散热系数 .....  $2.0\text{mW}/^{\circ}\text{C}$
- 最大功率 .....  $250\text{mW}$

■特点

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

■特性 Characteristics

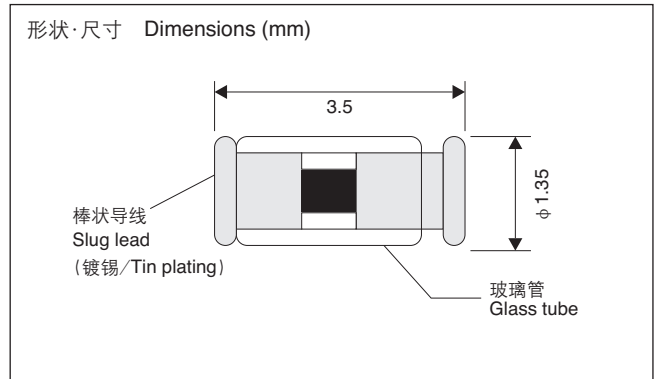
MH18系列 MH18 Series

型号 Type	电阻值 Resistance				B值 B25/50 B Value	B值 B25/85 B Value
	R25	电阻值 容许偏差 Resistance tolerance				
		$\pm 1\%$	$\pm 2\%$	$\pm 3\%$		
3G202**	2k $\Omega$	○	○	○	3,470K	3,507K
3G302**	3k $\Omega$	○	○	○	3,470K	3,507K
3G502**	5k $\Omega$	○	○	○	3,470K	3,507K
3H103**	10k $\Omega$	○	○	○	3,465K	3,502K
6E203**	20k $\Omega$	—	○	○	3,965K	4,016K
6P303**	30k $\Omega$	○	○	○	3,948K	3,984K
6H503**	50k $\Omega$	○	○	○	3,770K	3,820K
3U104**	100k $\Omega$	○	○	○	3,965K	4,038K
3U154**	150k $\Omega$	○	○	○	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 Home Page.

[High temp. range type]  
MN18 Series



- Resistance tolerance .....  $\pm 3\%$ ,  $\pm 5\%$  (R25)
- B value tolerance .....  $\pm 3\%$  (B25/50)
- Termination ..... Tin plating
- Operating temperature range .....  $-40^{\circ}\text{C}\sim+150^{\circ}\text{C}$
- Heat dissipation .....  $2.0\text{mW}/^{\circ}\text{C}$
- Maximum power dissipation .....  $250\text{mW}$

■Features

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

## [引脚类型] [Leaded type]

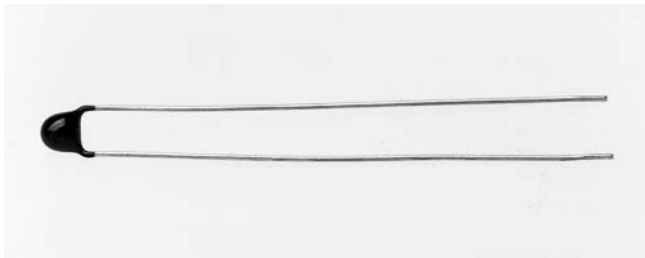
树脂涂层产品 Resin coated CN, CH, BN, BM, BF, DC Series	[高灵敏度型] [High sensitivity type] 树脂涂层产品 Resin coated RM, RH Series	[耐高温型] [High temperature type] 玻璃封装产品 Glass encapsulated GA, GH, GR Series
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## [用途] [Applications] [特点] [Features]

电池组 Battery pack	小型、高精度。 可对应不同导线长度的产品。 Small and Precise. Available with different lead lengths.	CN, CH, BN, BM, BF, DC系列 CN, CH, BN, BM, BF, DC Series
电子体温计 Clinical thermometer	小型、高精度、高灵敏度。 导线长，便于测定部安装。 Small, precise and sensitive. Long leads for easy placement.	RM, RH系列 RM, RH Series
车辆 Automobile	可在高温下使用。 Suitable for high temperature application.	GA, GH, GR系列 GA, GH, GR Series

## [径向引脚型]

### CN25系列



- 电阻值容许偏差 ..... ±3%, ±5% (R25)
- B值容许偏差 ..... ±3% (B25/50)
- 端子电极 ..... 无铅焊接涂层铜镍合金线
- 使用温度范围 ..... -40°C ~ +110°C
- 散热系数 ..... δ=0.7mW/°C
- 最大功率 ..... P=59.5mW

### ■特点

- 小型、高精度。
- 温度循环特性优异。

### ■特性 Characteristics

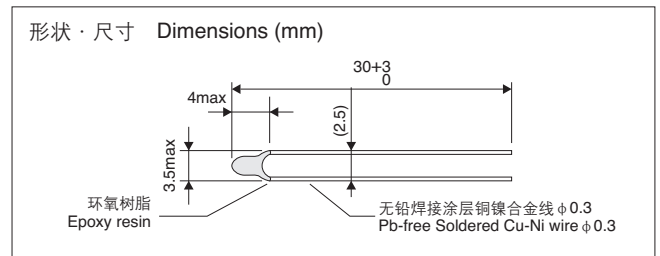
#### CN25系列 CN25 Series

型号 Type	电阻值 Resistance R25	B值 B Value B25/50	B值 B Value B25/85	热响应时间常数 Thermal time constant τ (sec.)	型号 Type	电阻值 Resistance R25	B值 B Value B25/50	B值 B Value B25/85	热响应时间常数 Thermal time constant τ (sec.)
3G501**	500Ω	3,450K	3,488K	14	3H103**	10kΩ	3,450K	3,486K	12
3G102**	1kΩ	3,450K	3,488K	12	3T103**		3,950K	3,989K	14
6D102**		3,930K	3,941K	14	3T203**	20kΩ	3,950K	3,989K	12
3G202**	2kΩ	3,450K	3,488K	14	3U303**	30kΩ	3,950K	4,025K	14
6D202**		3,930K	3,941K	12	3U503**	50kΩ	3,950K	4,025K	14
3G302**	3kΩ	3,450K	3,488K	12	3U104**	100kΩ	3,950K	4,025K	12
6D302**		3,930K	3,941K	14	4L204**	200kΩ	4,550K	4,629K	14
3H502**	5kΩ	3,450K	3,486K	14	4L304**	300kΩ	4,550K	4,629K	14
6E502**		3,950K	4,001K	12	4L504**	500kΩ	4,550K	4,629K	12

※关于R-T数据, 请参阅本公司主页。

## [Radial leaded type]

### CN25 Series

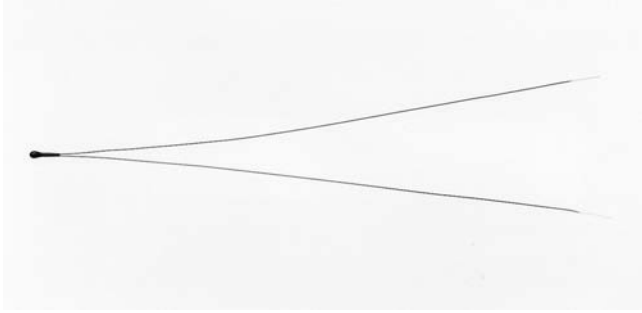


- Resistance tolerance ..... ±3%, ±5% (R25)
- B value tolerance ..... ±3% (B25/50)
- Termination ..... Pb-free Soldered Cu-Ni wire
- Operating temperature range ..... -40°C ~ +110°C
- Heat dissipation constant ..... δ=0.7mW/°C
- Maximum power dissipation ..... P=59.5mW

### ■Features

- Small precision type.
- Excellent thermal cycle endurance.

## RM16系列 RM16 Series



- 电阻值容许偏差 .....  $\pm 3\%, \pm 5\%$  (R25)
- B值容许偏差 .....  $\pm 3\%$  (B25/50)
- 端子电极 ..... 聚氨酯被覆线
- 使用温度范围 .....  $-40^{\circ}\text{C} \sim +110^{\circ}\text{C}$
- 散热系数 .....  $\delta=0.6\text{mW}/^{\circ}\text{C}$
- 热响应时间常数 .....  $\tau=6\text{sec.}$
- 最大功率 .....  $P=51\text{mW}$

### ■特点

- 小型、高精度。
- 导线长，便于安装于测定部。

### ■特性 Characteristics

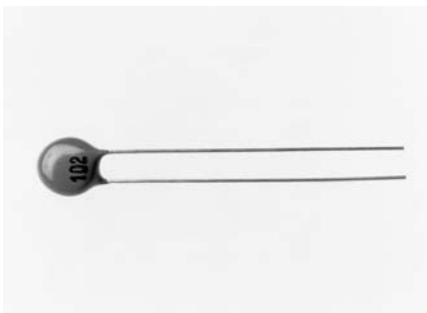
#### RM16系列 RM16 Series

型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value	型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value
3G102**	1k $\Omega$	3,450K	3,488K	6M303**	30k $\Omega$	3,970K	4,084K
3G202**	2k $\Omega$	3,450K	3,488K	3U503**	50k $\Omega$	3,950K	4,025K
6D502**	5k $\Omega$	3,930K	3,941K	3U803**	80k $\Omega$	3,950K	4,025K
3H103**	10k $\Omega$	3,450K	3,486K	3U104**	100k $\Omega$	3,950K	4,025K
6E103**		3,950K	4,001K	4A104**	100k $\Omega$	4,020K	4,099K
6M203**	20k $\Omega$	3,970K	4,084K				

※关于R-T数据，请参阅本公司主页。

※Regarding R-T data, please refer to our Home Page.

## DC30系列 DC30 Series



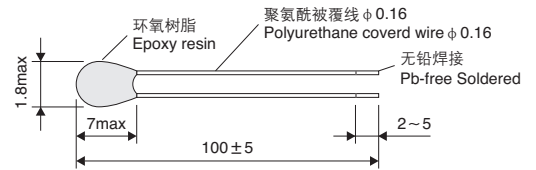
- 电阻值容许偏差 .....  $\pm 5\%, \pm 10\%$  (R25)
- B值容许偏差 .....  $\pm 3\%$  (B25/50)
- 端子电极 ..... 无铅焊接涂层铜镍合金线
- 使用温度范围 .....  $-40^{\circ}\text{C} \sim +100^{\circ}\text{C}$

### ■特点

- 适合自动插装。

※关于DC30系列的详细情况，请进行相关咨询。

### 形状·尺寸 Dimensions (mm)

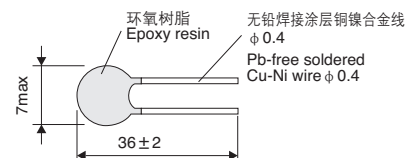


- Resistance tolerance .....  $\pm 3\%, \pm 5\%$  (R25)
- B value tolerance .....  $\pm 3\%$  (B25/50)
- Termination ..... Polyurethane covered wire
- Operating temperature range .....  $-40^{\circ}\text{C} \sim +110^{\circ}\text{C}$
- Heat dissipation constant .....  $\delta=0.6\text{mW}/^{\circ}\text{C}$
- Thermal time constant .....  $\tau=6\text{sec.}$
- Maximum power dissipation .....  $P=51\text{mW}$

### ■Features

- Small precision type.
- Long leads for easy sensor placement.

### 形状·尺寸 Dimensions (mm)



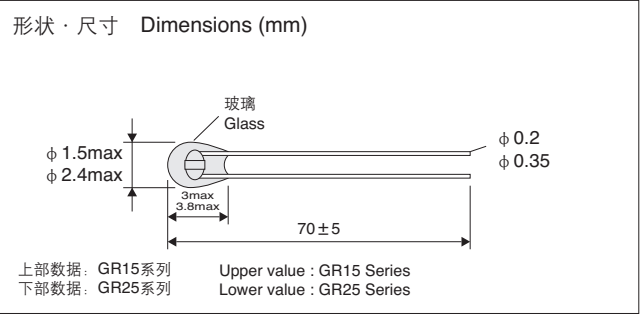
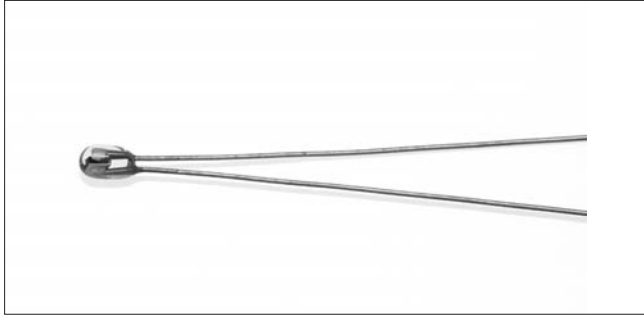
- Resistance tolerance .....  $\pm 5\%, \pm 10\%$  (R25)
- B value tolerance .....  $\pm 3\%$  (B25/50)
- Termination ..... Pb-free Soldered Cu-Ni wire
- Operating temperature range .....  $-40^{\circ}\text{C} \sim +100^{\circ}\text{C}$

### ■Features

- Can be used with automatic insertion equipment.

※Please contact us for the details of DC30 series.

## GR15,GR25系列 GR15,GR25 Series



- 电阻值容许偏差.....±3%, ±5% (R25)
- B值容许偏差..... ±3% (B25/50)
- 端子电极..... 杜美丝
- 使用温度范围.....-40°C~+300°C(150°C)
- 散热系数..... GR15: δ=0.7mW/°C  
GR25: δ=1.0mW/°C
- 热响应时间常数..... GR15: τ=6sec.  
GR25: τ=16sec.
- 最大功率..... GR15: P=87mW(150°C耐热产品)  
P=192mW(300°C耐热产品)  
GR25: P=125mW(150°C耐热产品)

- Resistance tolerance ..... ±3%, ±5%(R25)
- B value tolerance ..... ±3%(B25/50)
- Termination ..... Dumet wire
- Operating ..... -40°C~+300°C(150°C)  
temperature range
- Heat dissipation ..... GR15: δ=0.7mW/°C  
constant  
GR25: δ=1.0mW/°C
- Thermal time constant ..... GR15: τ=6sec.  
GR25: τ=16sec.
- Maximum power dissipation ..... GR15: P=87mW(max temp.150°C)  
P=192mW(max temp.300°C)  
GR25: P=125mW(max temp.150°C)

### ■特点

- 小型、高精度。
- 可在高温下使用。

### ■Features

- Small precision type.
- Suitable for high temperature applications.

### ■特性 Characteristics

#### 300°C耐热产品 GR15系列 300°C Heat resistance GR15 Series

型号 Type	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
7A103**	10kΩ	0.5309kΩ	0.04963kΩ	4,397K	4,369K	4,375K	4,184K
6P493**	49.12kΩ	3.315kΩ	0.3097kΩ	3,948K	3,984K	3,961K	4,185K
7C993**	98.63kΩ	6.264kΩ	0.5660kΩ	4,036K	4,074K	4,052K	4,245K
7B104**	100kΩ	3.813kΩ	0.2490kΩ	4,828K	4,843K	4,818K	4,818K
7D234**	231.4kΩ	12.98kΩ	1.017kΩ	4,207K	4,254K	4,221K	4,496K
5D105**	1MΩ	29.93kΩ	1.444kΩ	5,121K	5,184K	5,134K	5,352K
7E145**	1.388MΩ	63.87kΩ	4.021kΩ	4,460K	4,537K	4,488K	4,882K
5E106**	10MΩ	242.1kΩ	8.871kΩ	5,393K	5,486K	5,425K	5,838K

#### 150°C耐热产品 GR15系列 150°C Heat resistance GR15 Series

型号 Type	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	
6S222**	2.186kΩ	0.2166kΩ		3,386K	3,419K	3,390K	
3G302**	3kΩ	0.2757kΩ		3,490K	3,527K	3,499K	
6Q542**	5.369kΩ	0.5103kΩ		3,423K	3,468K	3,450K	
6Q852**	8.471kΩ	0.8051kΩ		3,423K	3,468K	3,450K	
6Q113**	10.74kΩ	1.021kΩ		3,423K	3,468K	3,450K	
6M373**	36.74kΩ	2.262kΩ		3,985K	4,099K	4,015K	
6N493**	48.70kΩ	3.125kΩ		3,935K	4,030K	3,988K	

#### 150°C耐热产品 GR25系列 150°C Heat resistance GR25 Series

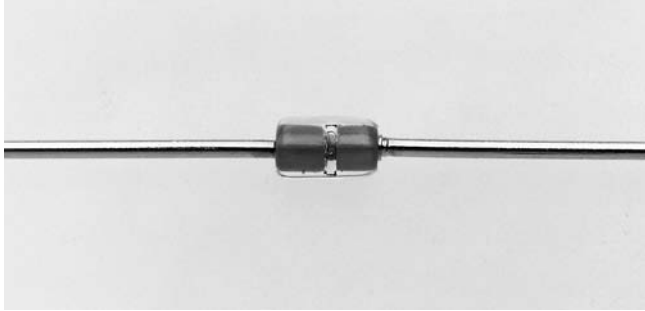
型号 Type	电阻值 R25 Resistance	电阻值 R100 Resistance		B值 B25/50 B Value	B值 B25/85 B Value	B值 B0/100 B Value	
3G202**	2kΩ	0.1838kΩ		3,490K	3,527K	3,499K	

※关于R-T数据,请参阅本公司主页。

※Regarding R-T data, please refer to our Home Page.

[轴向引脚型]

GA13、GA20系列



- 电阻值容许偏差 .....  $\pm 3\%$ ,  $\pm 5\%$  (R25)
- B值容许偏差 .....  $\pm 3\%$  (B25/50)
- 端子电极 ..... 镀镍或镀锡
- 使用温度范围 .....  $-40^{\circ}\text{C} \sim +300^{\circ}\text{C}$   
 $-40^{\circ}\text{C} \sim +150^{\circ}\text{C}$
- 散热系数 ..... GA13 :  $\delta=1.3\text{mW}/^{\circ}\text{C}$   
GA20 :  $\delta=1.8\text{mW}/^{\circ}\text{C}$
- 热响应时间常数 ..... GA13 :  $\tau=14\text{sec.}$ , GA20 :  $\tau=25\text{sec.}$
- 最大功率 ..... GA13 :  $P=357\text{mW}$ ( $300^{\circ}\text{C}$ 耐热产品)  
 $P=162\text{mW}$ ( $150^{\circ}\text{C}$ 耐热产品)  
GA20 :  $P=495\text{mW}$ ( $300^{\circ}\text{C}$ 耐热产品)  
 $P=225\text{mW}$ ( $150^{\circ}\text{C}$ 耐热产品)

■特点

- 可在高温下使用。
- 适合自动插装。

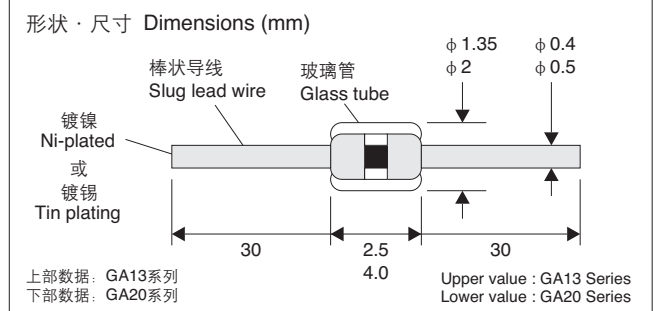
■特性 Characteristics

300°C耐热产品 300°C Heat resistance  
GA13系列 GA13 Series

型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value
3G202**	2k $\Omega$	3,470K	3,507K
3G302**	3k $\Omega$	3,470K	3,507K
6D502**	5k $\Omega$	3,950K	3,961K
6P303**	30k $\Omega$	3,948K	3,984K
3U104**	100k $\Omega$	3,965K	4,038K

[Axial leaded type]

GA13, GA20 Series



- Resistance tolerance .....  $\pm 3\%$ ,  $\pm 5\%$  (R25)
- B value tolerance .....  $\pm 3\%$  (B25/50)
- Termination ..... Ni-plating or Tin plating
- Operating .....  $-40^{\circ}\text{C} \sim +300^{\circ}\text{C}$   
temperature range  $-40^{\circ}\text{C} \sim +150^{\circ}\text{C}$
- Heat dissipation ..... GA13 :  $\delta=1.3\text{mW}/^{\circ}\text{C}$   
constant GA20 :  $\delta=1.8\text{mW}/^{\circ}\text{C}$
- Thermal time constant ..... GA13 :  $\tau=14\text{sec.}$ , GA20 :  $\tau=25\text{sec.}$
- Maximum power dissipation ..... GA13 :  $P=357\text{mW}$ (max temp.  $300^{\circ}\text{C}$ )  
 $P=162\text{mW}$ (max temp.  $150^{\circ}\text{C}$ )  
GA20 :  $P=495\text{mW}$ (max temp.  $300^{\circ}\text{C}$ )  
 $P=225\text{mW}$ (max temp.  $150^{\circ}\text{C}$ )

■Features

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

NTC热敏电阻

150°C耐热产品 150°C Heat resistance  
GA13系列 GA13 Series

型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value
3H103**	10k $\Omega$	3,465K	3,502K
6E203**	20k $\Omega$	3,965K	4,016K
6H503**	50k $\Omega$	3,770K	3,820K

GA20系列 GA20 Series

型号 Type	电阻值 R25 Resistance	B值 B25/50 B Value	B值 B25/85 B Value
3G202**	2k $\Omega$	3,470K	3,507K
3G302**	3k $\Omega$	3,470K	3,507K
6D502**	5k $\Omega$	3,950K	3,961K
6P203**	20k $\Omega$	3,948K	3,984K
6P303**	30k $\Omega$	3,948K	3,984K
3U503**	50K $\Omega$	3,965K	4,038K
3U104**	100K $\Omega$	3,965K	4,038K

※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 $150^{\circ}\text{C}$ 。  
※关于R-T数据, 请参阅本公司主页。

※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  $150^{\circ}\text{C}$ .  
※Regarding R-T data, please refer to our Home Page.



## [高精度引脚型]

高精度系列产品，可用于高精度电路的温度补偿或温度控制、温度测量上，要求电阻值及B值的容许偏差极小的产品。

## [High precision leaded type]

The high precision has very tight resistance and B value tolerances to allow very accurate temperature control or compensation.

### 形状 Type

尺寸 Dimensions (mm)

系列名 Series	形状 Construction	使用温度范围 Operating Temp.range
CH25		-40°C ~ +110°C
RH16		-40°C ~ +110°C
BN35		-20°C ~ +80°C
		L=25mm    BN35-*****-25
		L=50mm    BN35-*****-50
		L=75mm    BN35-*****-75
		L=100mm    BN35-*****-100
		L=125mm    BN35-*****-125
L=150mm    BN35-*****-150		
BM22 BM38		-40°C ~ +100°C
		L=25mm    BM22(38)-*****-250
		L=50mm    BM22(38)-*****-050
		L=75mm    BM22(38)-*****-075
		L=100mm    BM22(38)-*****-100
		L=125mm    BM22(38)-*****-125
BF05		-40°C ~ +100°C
		L=27mm    BF05-*****-250
		L=52mm    BF05-*****-050
		L=77mm    BF05-*****-075
		L=102mm    BF05-*****-100
		L=127mm    BF05-*****-125
GR15		-40°C ~ +300(150)°C
GR25		-40°C ~ +150°C
GH13 GH20		-40°C ~ +300(150)°C
		-40°C ~ +300(150)°C

※有关CH25,RH16,BN35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。

※BM22,BM38,BF05系列是低卤素规格产品。

※For CH25, RH16, 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.

※For BM22, BM38,BF05 series, low - halogen is also applied.

CH25, RH16, BN35, BM22, BM38, BF05系列

CH25, RH16, BN35, BM22, BM38, BF05 Series

- 散热系数 · CH25:δ=0.7mW/°C, RH16:δ=0.6mW/°C, BN35:δ=2.4mW/°C, BM22:δ=1.2mW/°C, BM38:δ=1.3mW/°C, BF05:δ=1.5mW/°C
- 最大功率 · CH25:P=59.5mW, RH16:P=51mW, BN35:P=132mW, BM22:P=90mW, BM38:P=97.5mW, BF05:P=112mW

- Heat dissipation constant · CH25:δ=0.7mW/°C, RH16:δ=0.6mW/°C, BN35:δ=2.4mW/°C, BM22:δ=1.2mW/°C, BM38:δ=1.3mW/°C, BF05:δ=1.5mW/°C
- Maximum power dissipation · CH25:P=59.5mW, RH16:P=51mW, BN35:P=132mW, BM22:P=90mW, BM38:P=97.5mW, BF05:P=112mW

系列名 Series	型号 Type	电阻值 Resistance				B值 B25/50 B Value	B值 B25/85 B Value	热时间常数 Thermal time constant τ (sec.)	
		R25	电阻值容许偏差 Resistance tolerance						
			±1%	±2%	±3%				
CH25	3G501**	500Ω	○	○	○	3,450K ± 1%	3,488K	14	
	3G102**	1kΩ	○	○	○	3,450K ± 1%	3,488K	12	
	6D102**		○	○	○	3,930K ± 1%	3,941K	14	
	3G202**	2kΩ	○	○	○	3,450K ± 1%	3,488K	14	
	6D202**		○	○	○	3,930K ± 1%	3,941K	12	
	3G302**	3kΩ	○	○	○	3,450K ± 1%	3,488K	12	
	6D302**		○	○	○	3,930K ± 1%	3,941K	14	
	3H502**	5kΩ	○	○	○	3,450K ± 1%	3,486K	14	
	6E502**		—	○	○	3,950K ± 1%	4,001K	12	
	3H103**		10kΩ	○	○	○	3,450K ± 1%	3,486K	12
	3T103**			○	○	○	3,950K ± 1%	3,989K	14
	3T203**	20kΩ	○	○	○	3,950K ± 1%	3,989K	12	
	3U303**	30kΩ	○	○	○	3,950K ± 1%	4,025K	14	
	3U503**	50kΩ	○	○	○	3,950K ± 1%	4,025K	14	
	3U104**	100kΩ	○	○	○	3,950K ± 1%	4,025K	12	
	4L204**	200kΩ	—	○	○	4,550K ± 1%	4,629K	14	
	4L304**	300kΩ	—	○	○	4,550K ± 1%	4,629K	14	
	4L504**	500kΩ	—	○	○	4,550K ± 1%	4,629K	12	
	RH16	3G202**	2kΩ	○	○	○	3,450K ± 1%	3,488K	6
		6D502**	5kΩ	○	○	○	3,930K ± 1%	3,941K	6
3H103**		10kΩ	○	○	○	3,450K ± 1%	3,486K	6	
6E103**			○	○	○	3,950K ± 1%	4,001K	6	
6M203**		20kΩ	○	○	○	3,970K ± 1%	4,084K	6	
6M303**		30kΩ	○	○	○	3,970K ± 1%	4,084K	6	
3U503**		50kΩ	○	○	○	3,950K ± 1%	4,025K	6	
3U803**		80kΩ	○	○	○	3,950K ± 1%	4,025K	6	
3U104**		100kΩ	○	○	○	3,950K ± 1%	4,025K	6	
4A104**		100kΩ	—	○	○	4,020K ± 1%	4,099K	6	
BN35	3H103**	10kΩ	○	○	○	3,450K ± 1%	3,486K	40	
	3T103**	10kΩ	○	○	○	3,950K ± 1%	3,989K	40	
	3U104**	100kΩ	○	○	○	3,950K ± 1%	4,024K	40	
	5B225**	2.2MΩ	—	—	○	5,200K ± 1%	5,290K	40	
新产品	BM22	3H103**	10kΩ	○	○	3,450K ± 1%	3,486K	18	
BM38	3H103**	10kΩ	○	○	○	3,450K ± 1%	3,486K	21	
	3I103**	10kΩ	○	○	○	3,392K ± 1%	3,416K	21	
	3J103**	10kΩ	○	○	○	3,450K ± 1%	3,469K	21	
新产品	BF05	3I103**	10kΩ	○	○	3,392K ± 1%	3,416K	12	
3J103**		10kΩ	○	○	○	3,450K ± 1%	3,469K	12	

※BN35系列中也有通过UL1434标准的产品。  
※关于R-T数据,请参阅本公司主页。

※It is available in a UL1434 approved type for BN35 series.  
※Regarding R-T data, please refer to our Home Page.

GR15、GR25系列

GR15, GR25 Series

- 散热系数 · GR15 : δ = 0.7mW/°C, GR25 : δ = 1.0mW/°C
- 热响应时间常数 · GR15 : τ = 6sec. GR25 : τ = 16sec.
- 最大功率 · GR15 : P = 87mW (150°C耐热产品)  
P = 192mW (300°C耐热产品)  
GR25 : P = 125mW (150°C耐热产品)

- Heat dissipation constant · GR15 : δ = 0.7mW/°C, GR25 : δ = 1.0mW/°C
- Thermal time constant · GR15 : τ = 6sec. GR25 : τ = 16sec.
- Maximum power dissipation · GR15 : P = 87mW(max temp.150°C)  
P = 192mW(max temp.300°C)  
GR25 : P = 125mW(max temp.150°C)

300°C耐热产品 300°C Heat resistance

系列名 Series	型号 Type	R25	电阻值 Resistance			B值 B25/50 B Value	B值 B25/85 B Value
			电阻值容许偏差 Resistance tolerance				
			±1%	±2%	±3%		
GR15	7A103**	10kΩ	○	○	○	4,397K ± 1%	4,369K
	6P493**	49.12kΩ	○	○	○	3,948K ± 1%	3,984K
	7C993**	98.63kΩ	○	○	○	4,036K ± 1%	4,074K
	7B104**	100kΩ	○	○	○	4,828K ± 1%	4,843K
	7D234**	231.4kΩ	○	○	○	4,207K ± 1%	4,254K
	5D105**	1MΩ	○	○	○	5,121K ± 1%	5,184K
	7E145**	1.388MΩ	○	○	○	4,460K ± 1%	4,537K
	5E106**	10MΩ	○	○	○	5,393K ± 1%	5,486K

150°C耐热产品 150°C Heat resistance

系列名 Series	型号 Type	R25	电阻值 Resistance			B值 B25/50 B Value	B值 B25/85 B Value
			电阻值容许偏差 Resistance tolerance				
			±1%	±2%	±3%		
GR15	6S222**	2.186kΩ	—	○	○	3,386K ± 1%	3,419K
	3G302**	3kΩ	—	○	○	3,490K ± 1%	3,527K
	6Q542**	5.369kΩ	—	○	○	3,423K ± 1%	3,468K
	6Q852**	8.471kΩ	—	○	○	3,423K ± 1%	3,468K
	6Q113**	10.74kΩ	—	○	○	3,423K ± 1%	3,468K
	6M373**	36.74kΩ	○	○	○	3,985K ± 1%	4,099K
	6N493**	48.70kΩ	○	○	○	3,935K ± 1%	4,030K
GR25	3G202**	2kΩ	○	○	○	3,490K ± 1%	3,527K

※关于R-T数据,请参阅本公司主页。

※Regarding R-T data, please refer to our Home Page.

NTC热敏电阻

## GH13, GH20系列

- 散热系数 ..... GH13 :  $\delta=1.3\text{mW}/^{\circ}\text{C}$   
GH20 :  $\delta=1.8\text{mW}/^{\circ}\text{C}$
- 热响应时间常数 ..... GH13 :  $\tau=14\text{sec.}$ , GH20 :  $\tau=25\text{sec.}$
- 最大功率 ..... GH13 :  $P=357\text{mW}$  (300 $^{\circ}\text{C}$ 耐热产品)  
 $P=162\text{mW}$  (150 $^{\circ}\text{C}$ 耐热产品)  
GH20 :  $P=495\text{mW}$  (300 $^{\circ}\text{C}$ 耐热产品)  
 $P=225\text{mW}$  (150 $^{\circ}\text{C}$ 耐热产品)

## GH13, GH20 Series

- Heat dissipation ..... GH13 :  $\delta=1.3\text{mW}/^{\circ}\text{C}$   
constant GH20 :  $\delta=1.8\text{mW}/^{\circ}\text{C}$
- Thermal time constant ..... GH13 :  $\tau=14\text{sec.}$ , GH20 :  $\tau=25\text{sec.}$
- Maximum power dissipation ..... GH13 :  $P=357\text{mW}$ (max temp.300 $^{\circ}\text{C}$ )  
 $P=162\text{mW}$ (max temp.150 $^{\circ}\text{C}$ )  
GH20 :  $P=495\text{mW}$ (max temp.300 $^{\circ}\text{C}$ )  
 $P=225\text{mW}$ (max temp.150 $^{\circ}\text{C}$ )

### 300 $^{\circ}\text{C}$ 耐热产品 300 $^{\circ}\text{C}$ Heat resistance

系列名 Series	型号 Type	电阻值 Resistance				B值 B25/50 B Value	B值 B25/85 B Value
		R25	电阻值容许偏差 Resistance tolerance				
			$\pm 1\%$	$\pm 2\%$	$\pm 3\%$		
GH13	3G202* *	2k $\Omega$	○	○	○	3,470K $\pm 1\%$	3,507K
	3G302* *	3k $\Omega$	○	○	○	3,470K $\pm 1\%$	3,507K
	6D502* *	5k $\Omega$	○	○	○	3,950K $\pm 1\%$	3,961K
	6P303* *	30k $\Omega$	○	○	○	3,948K $\pm 1\%$	3,984K
	3U104* *	100k $\Omega$	○	○	○	3,965K $\pm 1\%$	4,038K
GH20	3G202* *	2k $\Omega$	○	○	○	3,470K $\pm 1\%$	3,507K
	3G302* *	3k $\Omega$	○	○	○	3,470K $\pm 1\%$	3,507K
	6D502* *	5k $\Omega$	○	○	○	3,950K $\pm 1\%$	3,961K
	6P203* *	20k $\Omega$	○	○	○	3,948K $\pm 1\%$	3,984K
	6P303* *	30k $\Omega$	○	○	○	3,948K $\pm 1\%$	3,984K
	3U503* *	50k $\Omega$	○	○	○	3,965K $\pm 1\%$	4,038K
	3U104* *	100k $\Omega$	○	○	○	3,965K $\pm 1\%$	4,038K

※关于R-T数据, 请参阅本公司主页。

※Regarding R-T data, please refer to our Home Page.

### 150 $^{\circ}\text{C}$ 耐热产品 150 $^{\circ}\text{C}$ Heat resistance

系列名 Series	型号 Type	电阻值 Resistance				B值 B25/50 B Value	B值 B25/85 B Value
		R25	电阻值容许偏差 Resistance tolerance				
			$\pm 1\%$	$\pm 2\%$	$\pm 3\%$		
GH13	3H103* *	10k $\Omega$	○	○	○	3,465K $\pm 1\%$	3,502K
	6E203* *	20k $\Omega$	—	○	○	3,965K $\pm 1\%$	4,016K
	6H503* *	50k $\Omega$	○	○	○	3,770K $\pm 1\%$	3,820K
GH20	3H103* *	10k $\Omega$	○	○	○	3,465K $\pm 1\%$	3,502K

※关于R-T数据, 请参阅本公司主页。

※Regarding R-T data, please refer to our Home Page.

※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 $^{\circ}\text{C}$ 。

※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 $^{\circ}\text{C}$ .

#### 【温度传感器使用注意事项】

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

- ① 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, 请进行传感器贴装评估试验, 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上下限的急剧温度变化。
- ⑦ 将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传感器(包括导线)的措施。
- ⑨ 请勿施加过度的振动、冲击及压力。
- ⑩ 请勿过度拉伸及弯曲导线。
- ⑪ 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。
- ⑫ 请勿在超出设定范围的腐蚀性气体的环境(CO<sub>2</sub>, NH<sub>3</sub>, SO<sub>x</sub>, NO<sub>x</sub>)以及会接触到电解质、盐水、酸、碱、有机溶剂的场所中使用。
- ⑬ 使用传感器进行树脂成型加工时, 可能会因组成构件的应力导致传感器破坏, 故应对此加以充分确认。

使用时若有其他不明之处, 请垂询本公司销售人员。

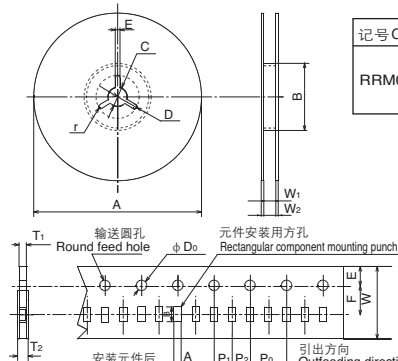
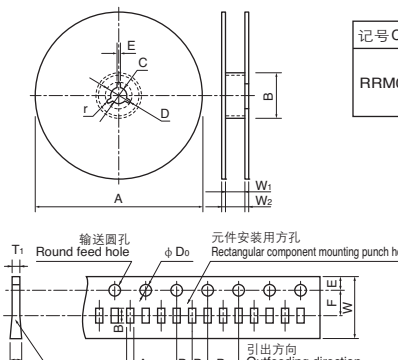
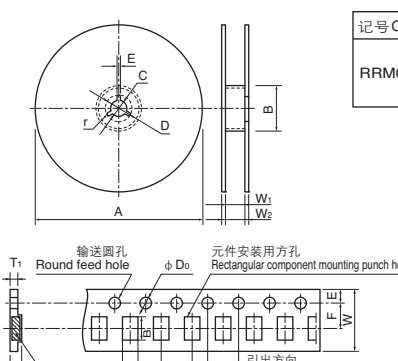
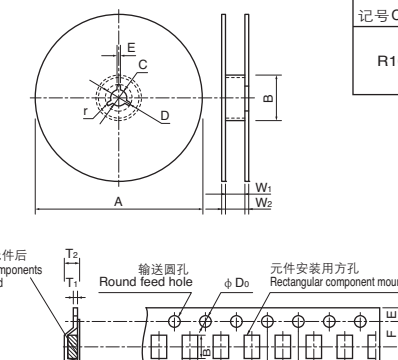
#### [Caution in On Board Thermistor Sensor usage]

Due to the possibilities of destruction of the sensor, damage or miss use of equipment, please strictly follow below matter.

- ① The sensor is designed for individual usage. When it is going to be used beyond the specified condition, please speak to your daily contact person for our products.
- ② Whenever designing the equipment, make sure to check sensor operation and if there is no lack of quality.
- ③ Do not use the sensor exceeding rated electric power.
- ④ Due to possibility of causing the decrease of the value of resistance with self heat and malfunction of the equipment or the precision decrease of the inspection temperature, carefully refer to the dissipation constant usage of electric power and voltage.
- ⑤ Do not use the sensor beyond operating temperature range.
- ⑥ Avoid from exceeding radical temperature change, which is beyond operating temperature range.
- ⑦ In case of independently use of the sensor as a main control of the device, make sure to design and devise through safety measures for [safe circuit] and [parallel use with same function sensor] etc, to prevent from accident.
- ⑧ Under the environment which receives the influence of electric noise, make sure to take countermeasure by installing a protection circuit and seal the sensor (including the lead wire).
- ⑨ Do not add excessive vibrating shocking pressure.
- ⑩ Avoid from excessive pulling and bending of the lead wire.
- ⑪ Do not impress excessive voltage in the insulated part and between the electrode. This might cause to occur the insulated malfunction.
- ⑫ Do not use in corrosiveness gas atmosphere (CO<sub>2</sub>, NH<sub>3</sub>, SO<sub>x</sub>, NO<sub>x</sub>) beyond the designated condition.  
Do not use at the place where the sensor touches the electrolytic, brine, acid, alkaline and organic solvent beyond the designated condition.
- ⑬ When you do processing (such as resin molding) by using thermistor sensor, please be reminded that sensor might be destroyed by the material or mismatch of it. If there is any others unclear point, please inquire to our company sales in-charge.

包装形式 Packing form


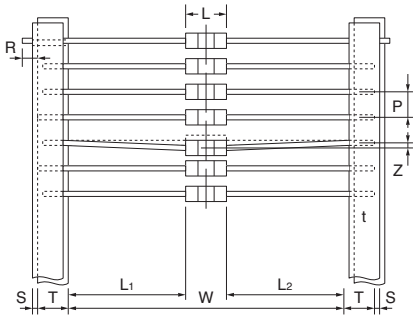
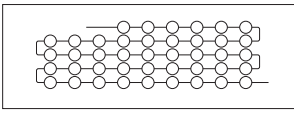
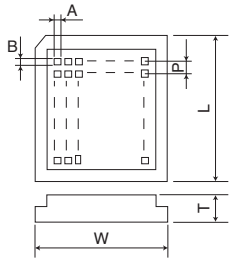
单位: mm Unit: mm

包装记号 Packing code	相应系列 Related series	包装数量 Packing Qty.	包 装 形 式 Packing form																																										
D	TS03 TC03 TH03	15,000	 <table border="1" data-bbox="909 392 1460 492"> <tr> <th>记号 Code</th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>W<sub>1</sub></th> <th>W<sub>2</sub></th> <th>r</th> </tr> <tr> <td>RRM08B</td> <td>∅180 +0 -3</td> <td>∅60 +1 -0</td> <td>∅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 border="1" data-bbox="1045 526 1460 604"> <tr> <th>A</th> <th>B</th> <th>W</th> <th>F</th> <th>E</th> <th>P<sub>1</sub></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 border="1" data-bbox="1045 616 1460 728"> <tr> <th>P<sub>2</sub></th> <th>P<sub>0</sub></th> <th>D<sub>0</sub></th> <th>T<sub>1</sub></th> <th>T<sub>2</sub></th> <th>安装孔 Loading hole</th> </tr> <tr> <td>2.0 ±0.1</td> <td>4.0 ±0.1</td> <td>∅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 <sub>1</sub>	W <sub>2</sub>	r	RRM08B	∅180 +0 -3	∅60 +1 -0	∅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 <sub>1</sub>	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 <sub>2</sub>	P <sub>0</sub>	D <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	安装孔 Loading hole	2.0 ±0.1	4.0 ±0.1	∅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
记号 Code	A	B	C	D	E	W <sub>1</sub>	W <sub>2</sub>	r																																					
RRM08B	∅180 +0 -3	∅60 +1 -0	∅13.0 ±0.2	R10.5 ±0.4	2.0 ±0.5	9.0 ±0.3	11.4 ±1.0	0.5																																					
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P <sub>2</sub>	P <sub>0</sub>	D <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	安装孔 Loading hole																																								
2.0 ±0.1	4.0 ±0.1	∅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																																								
R	TZ05 TX05 TD05 TN05 TC05 TH05	10,000	 <table border="1" data-bbox="909 795 1460 896"> <tr> <th>记号 Code</th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>W<sub>1</sub></th> <th>W<sub>2</sub></th> <th>r</th> </tr> <tr> <td>RRM08B</td> <td>∅180 +0 -3</td> <td>∅60 +1 -0</td> <td>∅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 border="1" data-bbox="1045 996 1460 1075"> <tr> <th>A</th> <th>B</th> <th>W</th> <th>F</th> <th>E</th> <th>P<sub>1</sub></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 border="1" data-bbox="1045 1086 1460 1198"> <tr> <th>P<sub>2</sub></th> <th>P<sub>0</sub></th> <th>D<sub>0</sub></th> <th>T<sub>1</sub></th> <th>T<sub>2</sub></th> <th>安装孔 Loading hole</th> </tr> <tr> <td>2.00 ±0.05</td> <td>4.0 ±0.1</td> <td>∅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 <sub>1</sub>	W <sub>2</sub>	r	RRM08B	∅180 +0 -3	∅60 +1 -0	∅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 <sub>1</sub>	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 <sub>2</sub>	P <sub>0</sub>	D <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	安装孔 Loading hole	2.00 ±0.05	4.0 ±0.1	∅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 border="1" data-bbox="909 1220 1460 1321"> <tr> <th>记号 Code</th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>W<sub>1</sub></th> <th>W<sub>2</sub></th> <th>r</th> </tr> <tr> <td>RRM08B</td> <td>∅180 +0 -3</td> <td>∅60 +1 -0</td> <td>∅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 border="1" data-bbox="1045 1377 1460 1456"> <tr> <th>A</th> <th>B</th> <th>W</th> <th>F</th> <th>E</th> <th>P<sub>1</sub></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> </table> <table border="1" data-bbox="1045 1467 1460 1601"> <tr> <th>P<sub>2</sub></th> <th>P<sub>0</sub></th> <th>D<sub>0</sub></th> <th>T<sub>1</sub></th> <th>T<sub>2</sub></th> <th>安装孔 Loading hole</th> </tr> <tr> <td>2.00 ±0.05</td> <td>4.0 ±0.1</td> <td>∅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> <p data-bbox="1085 1612 1436 1657">※( )内的数值是TN11, TH11, TN10, TC10的尺寸。 ※Dimensions in ( ) are for TN11, TH11, TN10, TC10.</p>	记号 Code	A	B	C	D	E	W <sub>1</sub>	W <sub>2</sub>	r	RRM08B	∅180 +0 -3	∅60 +1 -0	∅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 <sub>1</sub>	1.62 ±0.2	2.4 ±0.2	8.0 ±0.3	3.50 ±0.05	1.75 ±0.10	4.0 ±0.1	P <sub>2</sub>	P <sub>0</sub>	D <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	安装孔 Loading hole	2.00 ±0.05	4.0 ±0.1	∅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 border="1" data-bbox="909 1680 1460 1780"> <tr> <th>记号 Code</th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>W<sub>1</sub></th> <th>W<sub>2</sub></th> <th>r</th> </tr> <tr> <td>R10</td> <td>∅180 +0 -3</td> <td>∅60 +1 -0</td> <td>∅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 border="1" data-bbox="1045 1803 1460 1881"> <tr> <th>A</th> <th>B</th> <th>W</th> <th>F</th> <th>E</th> <th>P<sub>1</sub></th> </tr> <tr> <td>1.7 ±0.1</td> <td>4.1 ±0.1</td> <td>8.0 ±0.2</td> <td>3.55 ±0.1</td> <td>1.5 ±0.1</td> <td>4.0 ±0.1</td> </tr> </table> <table border="1" data-bbox="1045 1892 1460 2004"> <tr> <th>P<sub>2</sub></th> <th>P<sub>0</sub></th> <th>D<sub>0</sub></th> <th>T<sub>1</sub></th> <th>T<sub>2</sub></th> <th>安装孔 Loading hole</th> </tr> <tr> <td>2.00 ±0.05</td> <td>4.0 ±0.1</td> <td>∅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 <sub>1</sub>	W <sub>2</sub>	r	R10	∅180 +0 -3	∅60 +1 -0	∅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 <sub>1</sub>	1.7 ±0.1	4.1 ±0.1	8.0 ±0.2	3.55 ±0.1	1.5 ±0.1	4.0 ±0.1	P <sub>2</sub>	P <sub>0</sub>	D <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	安装孔 Loading hole	2.00 ±0.05	4.0 ±0.1	∅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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NTC热敏电阻

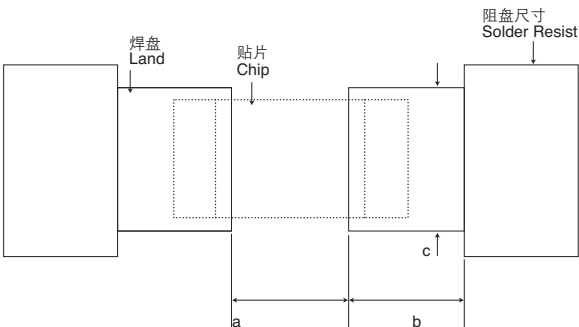
包装形式 Packing form

单位 : mm Unit : mm

包装记号 Packing code	相应系列 Related series	包装数量 Packing Qty.	包装形式 Packing form																							
B	TS03, TC03, TH03, TN05, TC05, TH05, TZ05, TX05, TD05, TN10, TC10, TN11, TH11, TD11, TN20, TC20, TH20,	500	聚乙烯袋 Poly bag 																							
	MN18, MH18, GA13, GH13, GA20, GH20, CN25, CH25, RM16, RH16, GR15	200																								
	DC30, GR25	100																								
F	GA13 GH13 GA20 GH20	2,000	 <p>产品引出方向(从侧面看) Feed direction (Side view)</p>  <table border="1"> <thead> <tr> <th>记号 Code</th> <th>尺寸 Dimensions</th> <th>记号 Code</th> <th>尺寸 Dimensions</th> </tr> </thead> <tbody> <tr> <td rowspan="2">L</td> <td>[GA13, GH13] 2.5<sup>+0.2</sup><sub>-0.4</sub></td> <td>T</td> <td>6.0±1.0</td> </tr> <tr> <td>[GA20, GH20] 4.0<sup>+0.2</sup><sub>-0.4</sub></td> <td>Z</td> <td>1.5max.</td> </tr> <tr> <td>W</td> <td>52.0<sup>+0.2</sup><sub>-1.0</sub></td> <td>R</td> <td>不可露出带外 Not sticking out of tape</td> </tr> <tr> <td>P</td> <td>5.0±0.5</td> <td>t</td> <td>3.2min.</td> </tr> <tr> <td>L1-L2</td> <td>1.0max.</td> <td>S</td> <td>0.8max.</td> </tr> </tbody> </table>	记号 Code	尺寸 Dimensions	记号 Code	尺寸 Dimensions	L	[GA13, GH13] 2.5 <sup>+0.2</sup> <sub>-0.4</sub>	T	6.0±1.0	[GA20, GH20] 4.0 <sup>+0.2</sup> <sub>-0.4</sub>	Z	1.5max.	W	52.0 <sup>+0.2</sup> <sub>-1.0</sub>	R	不可露出带外 Not sticking out of tape	P	5.0±0.5	t	3.2min.	L1-L2	1.0max.	S	0.8max.
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C	FH05 FH10	400	 <p>外壳 Plastic cover</p> <p>底板 Tray</p> <p>夹板 Clip</p> <table border="1"> <thead> <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> </thead> <tbody> <tr> <td>A, B</td> <td>[FH05] 0.38 [FH10] 0.66</td> <td>[FH05] 0.23</td> <td rowspan="4">400(20×20)</td> </tr> <tr> <td>P</td> <td>2.16</td> <td rowspan="3">[FH10] 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> </tbody> </table>	记号 Code	尺寸 Dimensions	凹空深度 depth of pockets	凹孔数(个) quantity of pockets(pcs.)	A, B	[FH05] 0.38 [FH10] 0.66	[FH05] 0.23	400(20×20)	P	2.16	[FH10] 0.30 or 0.38	L, W	50.8	T	3.96								
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NTC THERMISTOR  
热敏电阻

推荐焊盘布局 Recommended land Pattern



型号 Type	T*20	T*10, T*11	T*05	T*03
尺寸 Size	2.0×1.25	1.6×0.8	1.0×0.5	0.6×0.3
a	1.00	0.70	0.30	0.25
b	0.90	0.75	0.60	0.25
c	1.40	0.85	0.60	0.30

焊接条件请参见第92页

Please refer to page 92 for soldering conditions.

## [用途] [Applications]

## [系列] [Series]

室用空调机 Room air conditioner	室内温度、室外温度、排风口、热交换器用 Room temp., External air, Outlet air, Heat exchanger	AC系列 AC Series
车用空调机 Car air conditioner	室内温度、室外温度、排风口、热交换器用、蒸发器用 Room temp., External air, Outlet air, Heat exchanger, Evaporator	CA系列 CA Series
洗衣、干燥机用 Washing & Drying machine	干燥温度 Drying temp.	WD系列 WD Series
表面温度 Surface temperature	表面温度检测用 Surface temperature	ST系列 ST Series
热水器、温水器 Hot & instant boiler	温水用、冷水用 Hot water, Cool water	IB, HB系列 IB, HB Series
微波炉 Microwave oven	炉内温度检测用 Oven temp.	MW系列 MW Series
冰箱 Refrigerator	冷藏室温度      冷冻室温度      除霜 Cold Strage      Freezer Temp      Defrosting	RF系列 RF Series
温水冲洗马桶 Toilet	马桶座圈用、冲洗水用、温风用 Toilet seat, Washing water, Drying air	WT系列 WT Series

※关于WT系列的详情, 请垂询。  
※关于其他方面的用途, 也请垂询。

※Please contact us for detail of WT series, and other applications.

## ■型号构成

DTN    -    C    503    F    3U  
①            ②            ③            ④            ⑤

- ①表示热敏电阻的记号 ②热敏电阻元件类型记号
- ③标称电阻值...表示25°C时的电阻值  
前2位表示电阻值的有效数字, 第3位表示有效数字后“0”的个数。单位为Ω。
- ④电阻值容许偏差记号±(%)

记号	F	G	H	J	K	X
电阻值容许偏差	±1.0	±2.0	±3.0	±5.0	±10.0	特殊容许偏差

⑤B值记号。

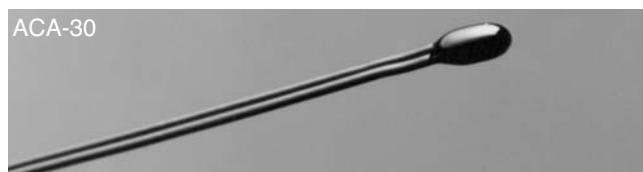
## 室用空调机用

### ■特点

- 防湿性能优异。
- 小型、温度响应快。



- 电阻值 ..... R<sub>25</sub>=15kΩ±3%(薄片)
- B值(3T) ..... B<sub>25/50</sub>=3950K±2%  
B<sub>25/85</sub>=3989K
- 使用温度范围 ..... -30°C~+100°C
- 用途 ..... 气温用
- 热响应时间常数(空气中) ..... 50sec.



- 电阻值 ..... R<sub>25</sub>=5kΩ±3%(薄片)
- B值(3T) ..... B<sub>25/50</sub>=3950K±2%  
B<sub>25/85</sub>=3989K
- 使用温度范围 ..... -30°C~+100°C
- 用途 ..... 遥控用
- 热响应时间常数(空气中) ..... 25sec.

※关于R-T数据, 请参阅本公司主页。  
※有关热敏温度传感器的使用环境条件, 请于本公司协商。

## ■Part number system

DTN    -    C    503    F    3U  
①            ②            ③            ④            ⑤

- ①Thermistor ②Thermistor element
- ③Expressed resistance in Ω (at 25°C). The first two digits are significant, and the third is the number of zeros.
- ④Resistance tolerance ±(%)

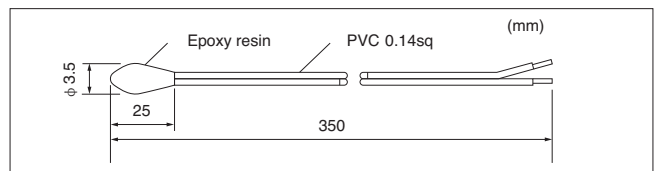
Symbol	F	G	H	J	K	X
Resistance tolerance	±1.0	±2.0	±3.0	±5.0	±10.0	Special Tolerance

⑤B value

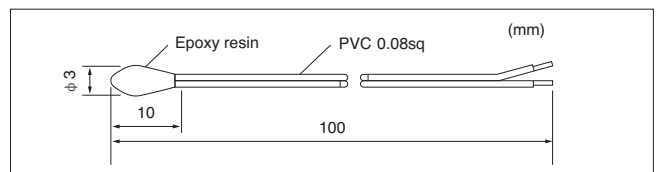
## Sensor for room air conditioner

### ■Features

- Moisture resistant.
- Small with quick temperature response.



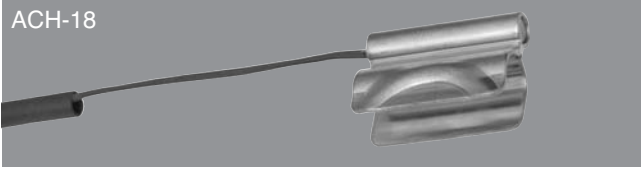
- Resistance ..... R<sub>25</sub>=15kΩ±3% (Flake chip)
- B value (3T) ..... B<sub>25/50</sub>=3950K±2%  
B<sub>25/85</sub>=3989K
- Operating temperature range ..... -30°C~+100°C
- Application ..... Air temperature
- Thermal time constant (in air) ..... 50sec.



- Resistance ..... R<sub>25</sub>=5kΩ±3% (Flake chip)
- B value (3T) ..... B<sub>25/50</sub>=3950K±2%  
B<sub>25/85</sub>=3989K
- Operating temperature range ..... -30°C~+100°C
- Application ..... Remote control
- Thermal time constant (in air) ..... 25sec.

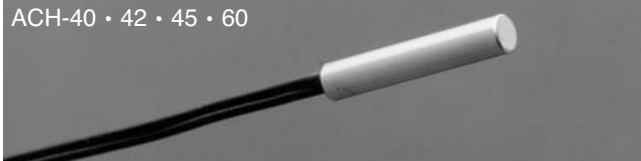
※Regarding R-T data, please refer to our Home Page.  
※Please consult us regarding the operating conditions of Thermistor sensors.

ACH-18



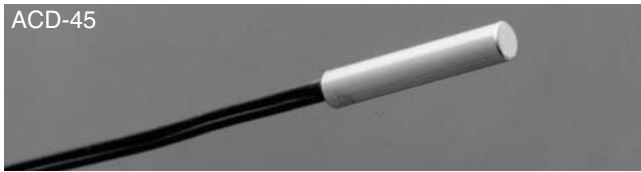
- 电阻值.....  $R_{25}=15k\Omega \pm 2\%$  (薄片)
- B值(3H).....  $B_{25/50}=3450K \pm 2\%$   
 $B_{25/85}=3486K$
- 使用温度范围.....  $-30^{\circ}C \sim +100^{\circ}C$
- 用途..... 热交换器用
- 热响应时间常数(水中)..... 5sec.

ACH-40 · 42 · 45 · 60



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

ACD-45



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

## 汽车空调机用 Sensor for car air conditioner

- 特点
- 防湿性能优异。
  - 小型、温度响应快。

CAE-60

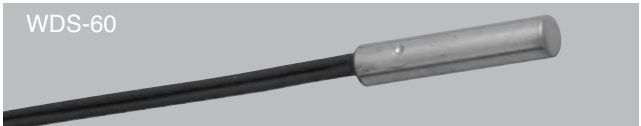


- 电阻值.....  $R_0=4.852k\Omega \pm 5\%$  (薄片)
- B值(6D).....  $B_{25/50}=3930K \pm 3\%$   
 $B_{25/85}=3941K$
- 使用温度范围.....  $-30^{\circ}C \sim +100^{\circ}C$
- 用途..... 蒸发器用
- 热响应时间常数(水中)..... 4sec.

## 洗衣干燥机用

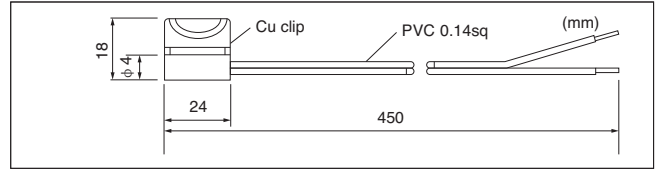
- 特点
- 耐热性能优异。
  - 防湿性能优异。

WDS-60

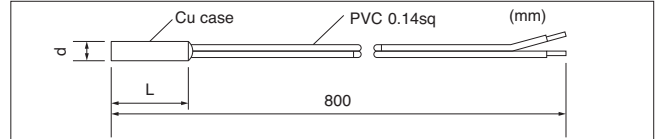


- 电阻值.....  $R_{100}=3.3k\Omega \pm 3\%$  (GR型)
- B值(6PR).....  $B_{25/100}=3999K \pm 2\%$
- 使用温度范围.....  $-30^{\circ}C \sim 150^{\circ}C$
- 热响应时间常数(水中)..... 10sec.

※关于R-T数据, 请参阅本公司主页。  
※有关热敏温度传感器的使用环境条件, 请于本公司协商。

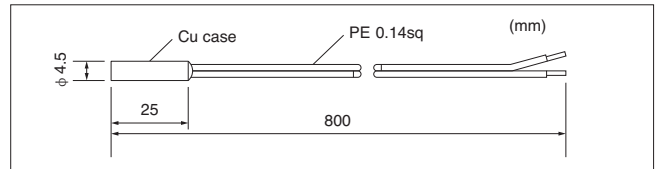


- Resistance.....  $R_{25}=15k\Omega \pm 2\%$  (Flake chip)
- B value (3H).....  $B_{25/50}=3450K \pm 2\%$   
 $B_{25/85}=3486K$
- Operating temperature range.....  $-30^{\circ}C \sim +100^{\circ}C$
- Application..... Heat exchanger
- Thermal time constant (in water)..... 5sec.



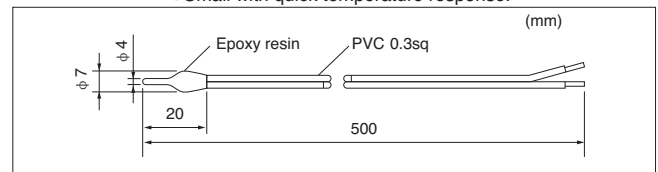
d(mm)	ø4.0	ø4.2	ø4.5	ø6.0
L(mm)	24	25	25	24

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



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

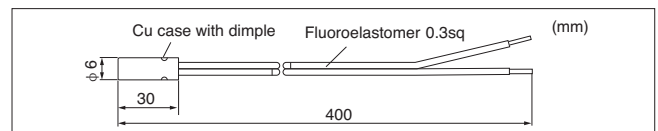
- Features
- Moisture resistant.
  - Small with quick temperature response.



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

## Sensor for Washing & Drying machine

- Features
- Resistance to high temperature.
  - Moisture resistant.



- Resistance.....  $R_{100}=3.3k\Omega \pm 3\%$  (GR TYPE)
- B value (6PR).....  $B_{25/100}=3999K \pm 2\%$
- Operating temperature range.....  $-30^{\circ}C \sim 150^{\circ}C$
- Thermal time constant (in water)..... 10sec.

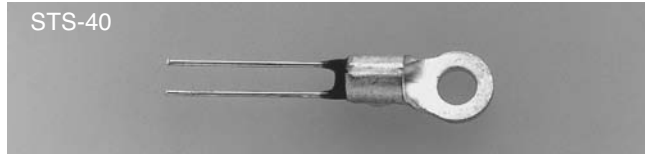
※Regarding R-T data, please refer to our Home Page.  
※Please consult us regarding the operating conditions of Thermistor sensors.

## 表面温度用 Sensor for measuring surface temperature

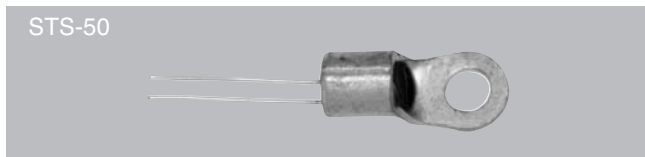
### ■特点

- 安装时可采用螺栓固定。
- 采用金属吸热面，温度响应快。

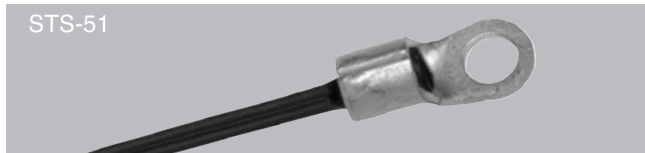
※STS系列的热时间常数是按照以下方法测定，所以测定值受氧化铝的热容量的影响。  
 首先用螺钉凝固氧化铝 (120L × 120W × 20Tmm)，然后将除温度传感器的部分浸入25度的水中。之后再将氧化铝移之50度的水中。



- 电阻值 .....  $R_{25}=10k\Omega \pm 1\%$  (薄片)
- 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.



- 电阻值 .....  $R_{25}=10k\Omega \pm 3\%$  (GA型)
- 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.



- 电阻值 .....  $R_{25}=10k\Omega \pm 5\%$  (CTH)
- B值 (3TV) .....  $B_{25/50}=3820K \pm 3\%$   
 $B_{25/85}=3792K$
- 使用温度范围 .....  $-40^{\circ}C \sim +150^{\circ}C$
- 热响应时间常数 (铝块上) ..... 27sec.

### 热水器用

### ■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。



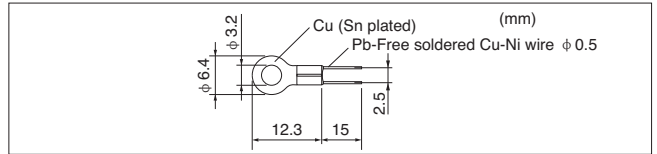
- 电阻值 .....  $R_{50}=3.485k\Omega \pm 2.5\%$  (GR型)
- B值 (6QR) .....  $B_{25/50}=3423K \pm 1\%$   
 $B_{25/85}=3468K$
- 使用温度范围 .....  $-30^{\circ}C \sim +105^{\circ}C$
- 热响应时间常数 (水中) ..... 0.8sec.

※关于R-T数据，请参阅本公司主页。  
 ※有关热敏温度传感器的使用环境条件，请于本公司协商。

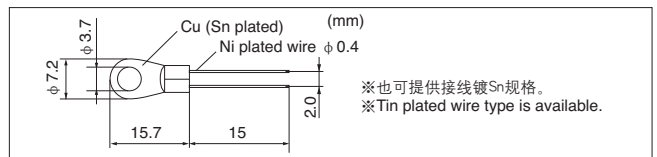
### ■Features

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

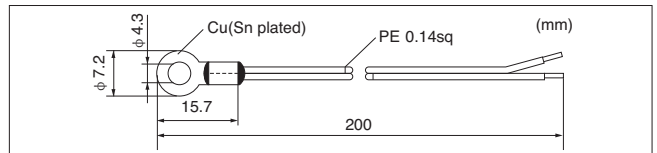
※Thermal time constant of STS series is measured by following method. The date contains the influence of the heat capacity of the aluminum block.  
 ※The sensor is screwed up on aluminum block(120L × 120W × 20Tmm), the block except sensor attached surface is put into 25°C water. From this state when block is moved into 50°C water.



- Resistance .....  $R_{25}=10k\Omega \pm 1\%$  (Flake chip)
- 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 A  $\ell$  block) ... 18sec.



- Resistance .....  $R_{25}=10k\Omega \pm 3\%$  (GA Type)
- 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 A  $\ell$  block) .. 22sec.

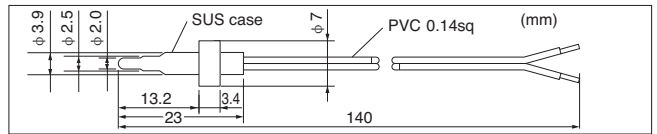


- Resistance .....  $R_{25}=10k\Omega \pm 5\%$  (CTH)
- B value (3TV) .....  $B_{25/50}=3820K \pm 3\%$   
 $B_{25/85}=3792K$
- Operating temperature range .....  $-40^{\circ}C \sim +150^{\circ}C$
- Thermal time constant (on A  $\ell$  block) ... 27sec.

### Sensor for instant boiler

### ■Features

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



- Resistance .....  $R_{50}=3.485k\Omega \pm 2.5\%$  (GR TYPE)
- 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.

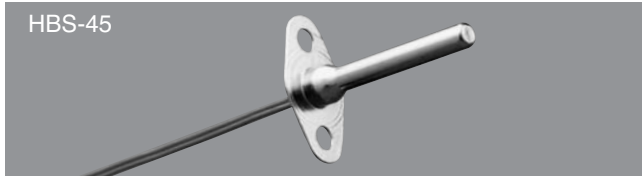
※Regarding R-T data, please refer to our Home Page.  
 ※Please consult us regarding the operating conditions of Thermistor sensors.



## 热水器用 Sensor for hot boiler

### ■特点

- 耐湿性能优异。



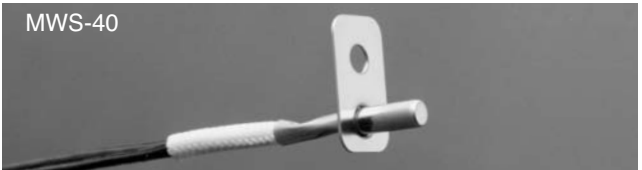
HBS-45

- 电阻值 .....  $R_{25}=11k\Omega \pm 3\%$  (薄片)
  - 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.
- ※关于R-T数据, 请参阅本公司主页。  
※有关热敏温度传感器的使用环境条件, 请于本公司协商。

## 微波炉用

### ■特点

- 耐热性能优异。
- 温度响应快。



MWS-40

- 电阻值 .....  $R_{200}=1k\Omega \pm 3\%$  (GA型)
- B值 (4BG) .....  $B_{25/50}=4100K \pm 2\%$   
 $B_{25/85}=4170K$
- 使用温度范围 .....  $-30^{\circ}C \sim +260^{\circ}C$  (仅传感器部)
- 热响应时间常数 (水中) ..... 20sec.



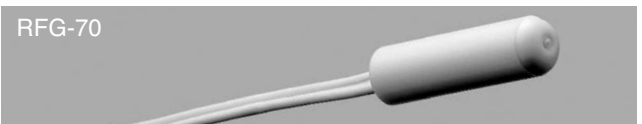
MWS-13

- 电阻值 .....  $R_{200}=1k\Omega \pm 3\%$  (GA型)
- B值 (4BG) .....  $B_{25/50}=4100K \pm 2\%$   
 $B_{25/85}=4170K$
- 使用温度范围 .....  $-30^{\circ}C \sim +260^{\circ}C$  (仅传感器部)
- 热响应时间常数 (水中) ..... 20sec.

## 冰箱用

### ■特点

- 防湿性能优异。



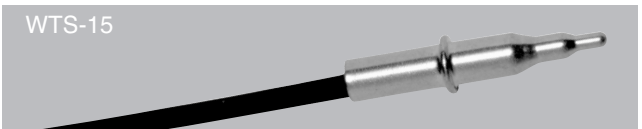
RFG-70

- 电阻值 .....  $R_0=6.35k\Omega \pm 3\%$  (薄片)
- B值 (6W) .....  $B_{0/25}=3823K \pm 2\%$   
 $B_{-20/0}=3738K$
- 使用温度范围 .....  $-40^{\circ}C \sim +80^{\circ}C$
- 用途 ..... 冰箱用 (冷冻、除霜、冷藏用)
- 热响应时间常数 (水中) ..... 25sec.

## 冲洗马桶用

### ■特点

- 热灵敏性极高。
- 不锈钢外壳, 耐腐蚀性能优异。

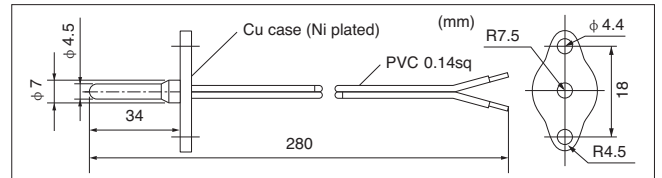


WTS-15

- 电阻值 .....  $R_{37}=29.46k\Omega \pm 3\%$  (GR型)
  - B值 (6PR) .....  $B_{25/50}=3948K \pm 1.5\%$   
 $B_{25/85}=3984K$
  - 使用温度范围 .....  $30^{\circ}C \sim 105^{\circ}C$
  - 热响应时间常数 (水中) ..... 0.5sec.
- ※关于R-T数据, 请参阅本公司主页。  
※有关热敏温度传感器的使用环境条件, 请于本公司协商。

## ■Features

- Moisture resistant.

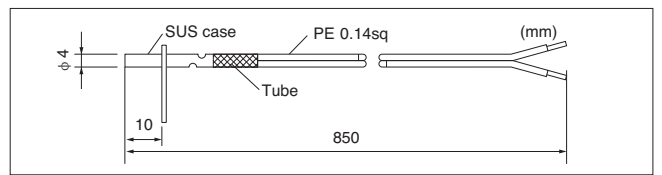


- Resistance .....  $R_{25}=11k\Omega \pm 3\%$  (Flake chip)
  - B value (3T) .....  $B_{25/50}=3950K \pm 2\%$   
 $B_{25/85}=3989K$
  - Operating temperature range .....  $-30^{\circ}C \sim +100^{\circ}C$
  - Thermal time constant (in water) ... 3sec.
- ※Regarding R-T data, please refer to our Home Page.  
※Please consult us regarding the operating conditions of NTC Thermistor sensors.

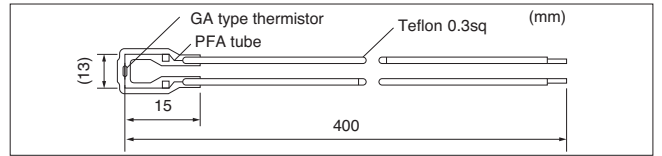
## Sensor for microwave oven

### ■Features

- Resistant to high temperature.
- Quick temperature response.



- Resistance .....  $R_{200}=1k\Omega \pm 3\%$  (GA Type)
- B value (4BG) .....  $B_{25/50}=4100K \pm 2\%$   
 $B_{25/85}=4170K$
- Operating temperature range .....  $-30^{\circ}C \sim +260^{\circ}C$  (Sensor only)
- Thermal time constant (in water) ... 20sec.

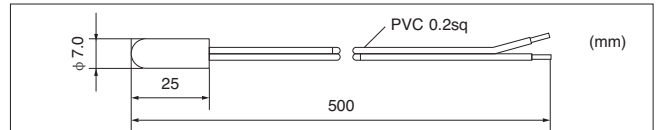


- Resistance .....  $R_{200}=1k\Omega \pm 3\%$  (GA Type)
- B value (4BG) .....  $B_{25/50}=4100K \pm 2\%$   
 $B_{25/85}=4170K$
- Operating temperature range .....  $-30^{\circ}C \sim +260^{\circ}C$  (Sensor only)
- Thermal time constant (in water) ... 20sec.

## Sensor for refrigerator

### ■Features

- Moisture resistant.

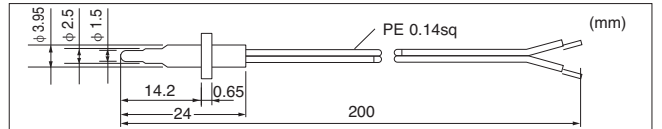


- Resistance .....  $R_0=6.35k\Omega \pm 3\%$  (Flake chip)
- B value (6W) .....  $B_{0/25}=3823K \pm 2\%$   
 $B_{-20/0}=3738K$
- Operating temperature range .....  $-40^{\circ}C \sim +80^{\circ}C$
- Application ..... Refrigerator (freezer, defrosting, cold storage)
- Thermal time constant (in water) ... 25sec.

## Sensor for Bidet

### ■Features

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



- Resistance .....  $R_{37}=29.46k\Omega \pm 3\%$  (GR TYPE)
  - B value (6PR) .....  $B_{25/50}=3948K \pm 1.5\%$   
 $B_{25/85}=3984K$
  - Operating temperature range .....  $30^{\circ}C \sim 105^{\circ}C$
  - Thermal time constant (in water) ... 0.5sec.
- ※Regarding R-T data, please refer to our Home Page.  
※Please consult us regarding the operating conditions of Thermistor sensors.

## 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，可进行高灵敏度、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。

$$\text{式1(eq1)} \quad R=R_0 \exp \{B(1/T-1/T_0)\}$$

R : 温度T(K)时的电阻值  
 R<sub>0</sub> : 温度T<sub>0</sub>(K)时的电阻值  
 B : B值  
 ※T(K)= t(°C)+273.15

但实际上，热敏电阻的B值并非恒定的，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所示的作为温度的函数计算时，则可降低与实测值之间的误差，可认为近似相等。

$$\text{式2(eq2)} \quad B_T=CT^2+DT+E$$

上式中，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(T<sub>0</sub>, R<sub>0</sub>)(T<sub>1</sub>, R<sub>1</sub>)(T<sub>2</sub>, R<sub>2</sub>)(T<sub>3</sub>, R<sub>3</sub>)，通过式3~6计算。  
 首先由式3根据T<sub>0</sub>和T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>的电阻值求出B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub>，然后代入以下各式样。

$$\text{式3(eq3)} \quad B_n = \frac{\ln(R_n/R_0)}{\frac{1}{T_n} - \frac{1}{T_0}}$$

$$\text{式4(eq4)} \quad C = \frac{(B_1-B_2)(T_2-T_3)-(B_2-B_3)(T_1-T_2)}{(T_1-T_2)(T_2-T_3)(T_1-T_3)}$$

$$\text{式5(eq5)} \quad D = \frac{B_1-B_2-C(T_1+T_2)(T_1-T_2)}{(T_1-T_2)}$$

$$\text{式6(eq6)} \quad E=B_1-DT_1-CT_1 \cdot T_1$$

- 电阻值计算例  
 试根据电阻－温度特性表，求25°C时的电阻值为5(kΩ)，B值偏差为50(K)的热敏电阻在10°C~30°C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<sub>T</sub>=CT<sup>2</sup>+DT+E+50，求B<sub>T</sub>。

③将数值代入R=5exp {B<sub>T</sub>(1/T-1/298.15)}，求R。  
 ※T : 10+273.15~30+273.15

## 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)  
 R<sub>0</sub> : resistance at absolute temperature T<sub>0</sub>(K)  
 B : B value  
 ※T(K)= t(°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 (T<sub>0</sub>, R<sub>0</sub>), (T<sub>1</sub>, R<sub>1</sub>), (T<sub>2</sub>, R<sub>2</sub>) and (T<sub>3</sub>, R<sub>3</sub>).  
 With equation 3, B<sub>1</sub>, B<sub>2</sub> and B<sub>3</sub>, can be determined from the resistance values for T<sub>0</sub> and T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and then substituted into the equations below.

- 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.

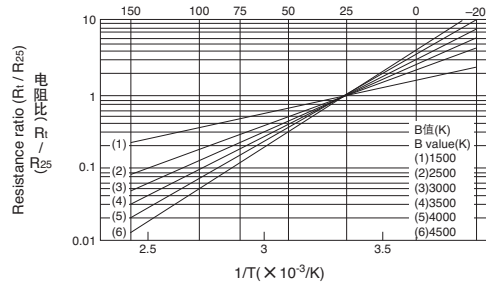
- Process  
 ①Determine the constants C, D and E from the resistance-temperature chart.

②B<sub>T</sub>=CT<sup>2</sup>+TD+E+50 ; substitute the value into equation and solve for B<sub>T</sub>

③R= 5exp {B<sub>T</sub>(1/T-1/298.15)} ; substitute the values into equation and solve for R  
 ※T : 10+273.15~30+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 ( $\alpha$ )，是指在任意温度下温度变化1°C(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 ( $\alpha$ ) 与B值的关系。

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

这里  $\alpha$  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 ( $\alpha$ ) 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 ( $\alpha$ ) 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 (JIS-C2570-1)

散热系数 ( $\delta$ ) 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°C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。

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

$$\ast (P = I^2 \cdot R = I \cdot V)$$

产品目录记载值为下列测定条件下的典型值。

- ① 25°C 静止空气中。
- ② 轴向引脚、径向引脚型在出厂状态下测定。

## ■ 最大功率 (JIS-C2570-1)

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°C为额定环境温度、由下式计算出的值。

$$(\text{式}) \text{ 额定功率} = \text{散热系数} \times (\text{最高使用温度} - 25)$$

## ■ 容许运行功率

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  $t^{\circ}\text{C}$  时，容许运行功率可由下式计算。

$$\text{容许运行功率} = t \times \text{散热系数}$$

## ■ 根据环境温度变化的热时间常数 (JIS-C2570-1)

指在零负载状态下，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  $T_1$  变为  $T_2$  时，经过时间  $t$  与热敏电阻的温度  $T$  之间存在以下关系。

## ■ Heat dissipation constant (JIS-C2570-1)

The dissipation constant ( $\delta$ ) 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:

- ① Room temp is 25°C
- ② Axial and radial leaded parts were measured in their shipping condition.

## ■ Maximum power dissipation (JIS-C2570-1)

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°C as the ambient temperature.

$$(\text{formula}) \text{ Rated power} = \text{heat dissipation constant} \times (\text{maximum operating temperature} - 25^{\circ}\text{C})$$

## ■ 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  $t^{\circ}\text{C}$  is the permissible temperature rise, can be calculated using the following formula.

$$\text{Permissible operating power} = t \times \text{heat dissipation constant}$$

## ■ Thermal time constant (JIS-C2570-1)

A constant expressed as the time for the temperature at the electrodes 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  $T_1$  to  $T_2$ , the relation between the elapsed time  $t$  and the thermistors temperature  $T$  can then be expressed by the following equation, by ambient temperature change.

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

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

常数  $\tau$  称热响应时间常数。

上式中，若令  $t = \tau$  时，则  $(T - T_1)/(T_2 - T_1) = 0.632$ 。

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	$\frac{T - T_1}{T_2 - T_1}$
$\tau$	63.2%
$2\tau$	86.5%
$3\tau$	95.0%
$4\tau$	98.2%
$5\tau$	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°C至25°C变化时，热敏电阻的温度变化至34.2°C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。

## ■ 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。

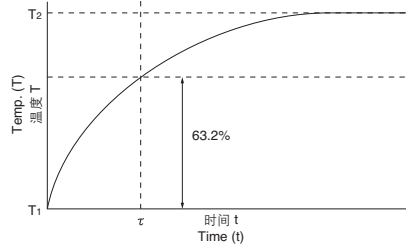
- ① 热敏传感器是按不同用途分别进行设计的。若要用于规定以外的用途时，请就使用环境条件与本公司联系洽谈。
  - ② 设计设备时，请进行热敏传感器贴装评估试验，确认无异常后再使用。
  - ③ 请勿在过高的功率下使用热敏传感器。
  - ④ 由于自身发热导致电阻值下降时，可能会引起温度检测精度降低、设备功能故障，故使用时请参考散热系数，注意热敏传感器的外加功率及电压。
  - ⑤ 请勿在使用温度范围以外使用。
  - ⑥ 请勿施加超出使用温度范围限制的急剧温度变化。
  - ⑦ 将热敏传感器作为装置的主控制元件单独使用时，为防止事故发生，请务必采取设置“安全电路”、“同时使用具有同等功能的热敏传感器”等周全的安全措施。
  - ⑧ 在有噪音的环境中使用时，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(水中、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露水，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 请勿过度拉伸及弯曲导线。
  - 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子(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<sub>2</sub>、NH<sub>3</sub>、SO<sub>x</sub>、NO<sub>x</sub>)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。

The constant  $\tau$  is called the heat dissipation constant.

If  $t = \tau$ , the equation becomes :  $(T - T_1) / (T_2 - T_1) = 0.632$

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:

- ① Part is moved from a 50°C environment to a still air 25°C environment until the temperature of the thermistor reaches 34.2°C.
- ② Axial 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

## ■ Caution in Thermistor Sensor usage

Due to the possibilities of destruction of the sensor, damage or miss use of equipment, please strictly follow below matter.

- ① The sensor is designed for individual usage. When it is going to be used beyond the specified condition, please speak to your daily contact person for our products.
- ② Whenever designing the equipment, make sure to check sensor operation and if there is no lack of quality.
- ③ Do not use the sensor exceeding rated electric power.
- ④ Due to possibility of causing the decrease of the value of resistance with self heat and malfunction of the equipment or the precision decrease of the inspection temperature, carefully refer to the dissipation constant usage of electric power and voltage.
- ⑤ Do not use the sensor beyond operating temperature range.
- ⑥ Avoid from exceeding radical temperature change, which is beyond operating temperature range.
- ⑦ In case of independently use of the sensor as a main control of the device, make sure to design and devise through safety measures for [safe circuit] and [parallel use with same function sensor] etc, to prevent from accident.
- ⑧ Under the environment which receives the influence of electric noise, make sure to take countermeasure by installing a protection circuit and seal the sensor (including the lead wire).
- ⑨ When the case type sensor is used under high humidity environment, make sure to design so that the protected case tip must be exposed to environment (in water, moisture) condition, and to the [utmost] open part of the case must be prevented from not touching water and steam directly.  
Please note how such as making the opening downward to install it so as not to stay in this part when you generate the be dewy water.
- ⑩ Do not add excessive vibrating shocking pressure.
- ⑪ Avoid from excessive pulling and bending of the lead wire.
- ⑫ Do not impress excessive voltage in the insulated part and between the electrode. This might cause to occur the insulated malfunction.
- ⑬ Consider wiring, due to contact failure might occur if the terminal of the lead wire (including the connector) is immersed into [water] [steam] [electrolyte] etc.
- ⑭ Do not use in corrosiveness gas atmosphere (Cl<sub>2</sub>, NH<sub>3</sub>, SO<sub>x</sub>, NO<sub>x</sub>) beyond the designated condition.  
Do not use at the place where the sensor touches the electrolytic, brine, acid, alkaline and organic solvent beyond the designated condition.
- ⑮ Due to possibility of the equipment becoming malfunction depending upon metal corrosion, consider not to cause potential difference with the contact metal for the case and screw equipped type sensor.  
If there is any others unclear point, please inquire to our company sales in-charge.

表面贴装电介质芯片天线是结合了应用广泛的本公司高频陶瓷技术与最先进高频设计技术的高性能透电式天线。具有小型、薄型、频带宽的特性。适合配置于小型便携式设备及通信模块中。

Surface mountable dielectric chip antennas are result of harmonizing our long experience in ceramic material & process technologies for high frequency applications together with cutting-edge RF design technologies. It is very small with low profile, but has a wide range of frequency band. It is suitable for compact mobile equipment and communication modules.

## AHD1103-ST01、AHD1403-ST01

### ■特点

- 小型、超薄的全向性天线。
- 比组装基板薄，适合配置在卡片式设备内。
- 不需要外部调整电路。
- 备有频率系列产品，可迅速提供最合适贴装条件的天线。

## AMD1103-ST01、AMD0302-ST01

### ■特点

- 小型、薄型天线
- 高增益
- 全向性
- 利用外部调整电路，可改变适用频带  
AMD1103-ST01：400MHz~1000 MHz  
AMD0302-ST01：2400MHz频带

## AHD1103-ST01, AHD1403-ST01

### ■Features

- Very small and thin, omni-directional antenna.
- Due to its compact size, suitable for equipment like cellular phone with a limited mounting space.
- No external tuning circuit
- By applying series of items with certain step of center frequency, it is easy to provide the most suitable antenna for your application quickly.

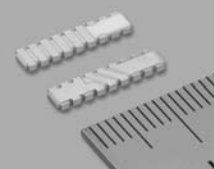
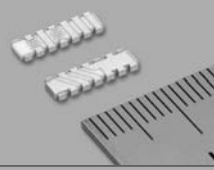
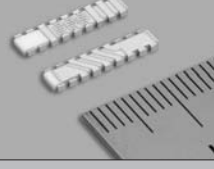
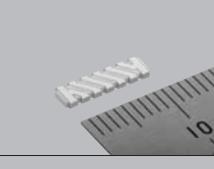
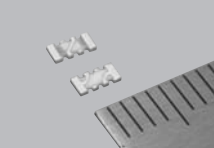
## AMD1103-ST01, AMD0302-ST01

### ■Features

- Very small
- High gain
- Omni-directional
- With an external tuning circuit, the adjustment to an application frequency range is possible.  
AMD1103-ST01 : 400 MHz~1000 MHz.  
AMD0302-ST01 : 2400 MHz band.

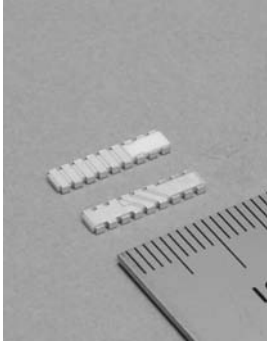
## 产品系列

## Products Line up

型号 Part number	形状 Style	频率范围 Frequency range	尺寸 Size	用途 Applications	页码 Page
AHD1403-244ST01		2400-2484MHz	13.5 × 3.0 × 0.8mm	<ul style="list-style-type: none"> <li>• Bluetooth™</li> <li>• ZigBee</li> <li>• 无线LAN</li> <li>• Wireless LAN</li> </ul>	83
AHD1103-244ST01		2400-2484MHz	10.5 × 3.0 × 0.8mm	<ul style="list-style-type: none"> <li>• Bluetooth™</li> <li>• ZigBee</li> <li>• 无线LAN</li> <li>• Wireless LAN</li> </ul>	83
AHD1403-191ST01		1880-1920MHz	13.5 × 3.0 × 0.8mm	<ul style="list-style-type: none"> <li>• PHS</li> <li>• DECT</li> </ul>	85
AMD1103-ST01		利用外部调整电路， 可在400~1000MHz的范围内 改变适用频带  With an external tuning circuit, frequency range is applicable from 400 MHz to 1000 MHz.	10.5 × 3.0 × 0.8mm	<ul style="list-style-type: none"> <li>• 遥测仪(工业用、医疗用)、遥控器、数据通信、无线开关系统、防盗报警系统、汽车安全系统、语音通信终端</li> <li>• Telemeter(Industrial&amp;medical use), Telemetry, Telecontroller, Datacommunication, Keyless entry system, Immobilizer system, Car security system, Voice communication terminal</li> </ul>	86 89
AMD0302-ST01		利用外部调整电路， 可调整为2400MHz频带  With an external tuning circuit, the adjustment is possible to 2400 MHz band.	3.2 × 1.5 × 0.5(max)mm	<ul style="list-style-type: none"> <li>• Bluetooth™</li> <li>• ZigBee</li> <li>• 无线LAN</li> <li>• Wireless LAN</li> </ul>	84

用于2.4GHz带 For 2.4GHz Band

●AHD1403-244ST01



■特点

- 小型、超薄的全向性天线。
- 结构小巧，最适用于移动电话等贴装空间小的设备。
- 比组装基板薄，适合配置在卡片式设备内。
- 具有宽频特性，即使因组装条件或使用条件使中心频率变动，也能有效覆盖通讯频带范围。
- 不需要外部调整电路。
- 有准备频率系列品，可迅速提供最适合安装条件的天线。

■用途

- 无线局域网、蓝牙等。

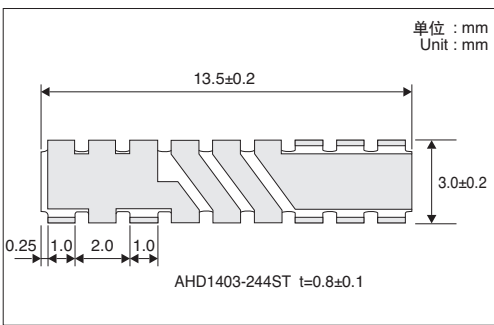
■Features

- Very small and thin, omni-directional antenna.
- Due to its compact size, suitable for equipment like cellular phone with a limited mounting space.
- Suitable for card shaped equipment due to its low profile.
- Wide frequency band allows a big margin to cover the required range even in case of center frequency shift with mounting condition and other environmental factors.
- By applying series of item with certain step of center frequency, it is easy to provide the most suitable antenna for your application quickly.

■Applications

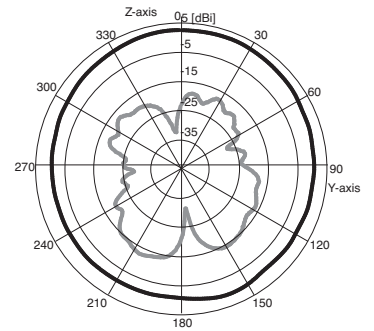
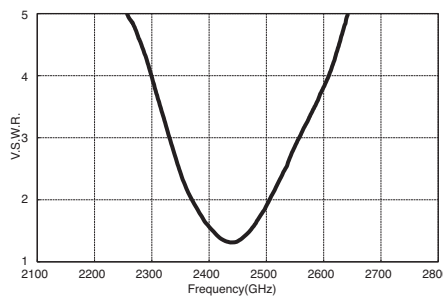
- Wireless LAN, Bluetooth™ etc.

■形状・尺寸 Dimensions

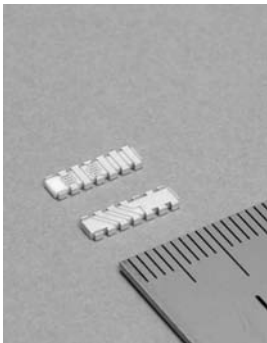


■AHD1403-244ST01的特性

Characteristics of AHD1403-244ST01



●AHD1103-244ST01



■特点

- 小型版AHD1403-ST01。
- 结构小巧，最适用于移动电话等贴装空间小的设备。
- 比组装基板薄，适合配置在卡片式设备内。
- 具有宽频特性，即使因组装条件或使用条件使中心频率变动，也能有效覆盖通讯频带范围。
- 不需要外部调整电路。
- 有准备频率系列品，可迅速提供最适合安装条件的天线。

■用途

- 无线局域网、蓝牙等。

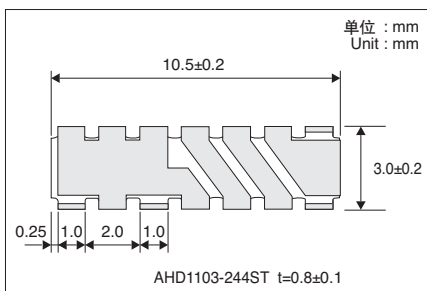
■Features

- Downsized version of AHD 1403 series.
- Due to its compact size, suitable for equipment like cellular phone with a limited mounting space.
- Suitable for card shaped equipment due to its low profile.
- Wide frequency band allows a big margin to cover the required range even in case of center frequency shift with mounting condition and other environmental factors.
- By applying series of item with certain step of center frequency, it is easy to provide the most suitable antenna for your application quickly.

■Applications

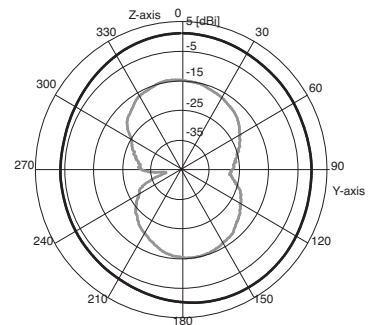
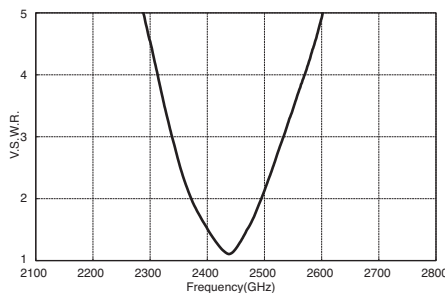
- Wireless LAN, Bluetooth™ etc.

■形状・尺寸 Dimensions



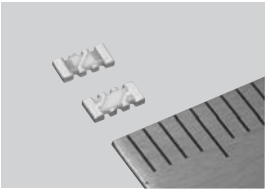
■AHD1103-244ST01的特性

Characteristics of AHD1103-244ST01



用于2.4GHz带 For 2.4GHz Band

●AMD0302-ST01



■特点

- 小型、薄型天线
- 高增益
- 全向性
- 利用外部调整电路，可调节适用频带

■Features

- Very small
- High gain
- Omini-directional
- With an external tuning circuit, the adjustment to an application frequency range is possible.

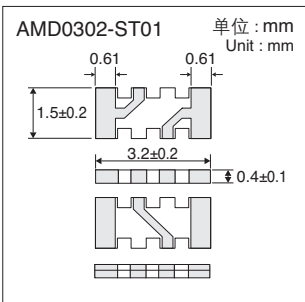
■用途

- 无线局域网、蓝牙等。

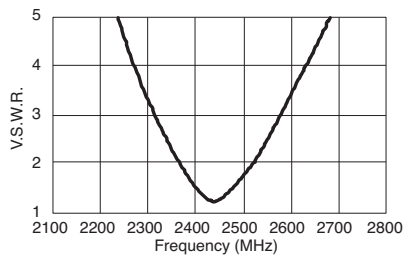
■Applications

- Wireless LAN, Bluetooth™ etc.

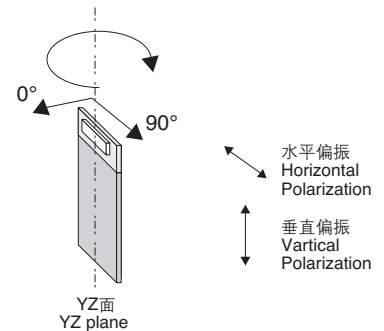
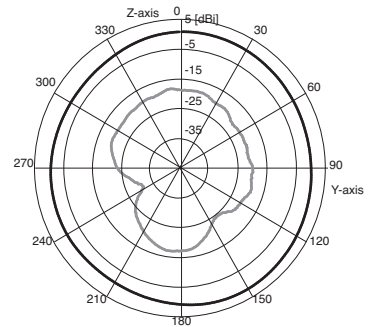
■形状・尺寸 Dimensions



■V.S.W.R.的特性及其放射特性(参考) 2440MHz调整



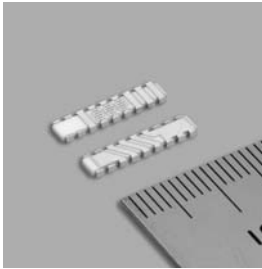
V.S.W.R. & radiation characteristics (Reference) : 2440 MHz



\*上述特性为典型特性，并非保证特性。  
\*These characteristics are not guaranteed ones, but typical ones.

用于1.9GHz带 For 1.9GHz Band

●AHD1403-191ST01



■特点

- 小型、超薄的全向性天线。
- 结构小巧，最适用于移动电话等贴装空间小的设备。
- 比组装基板薄，适合配置在卡片式设备内。
- 具有宽频特性，即使因组装条件或使用条件使中心频率变动，也能有效覆盖通讯频段范围。
- 不需要外部调整电路。
- 有准备频率系列品，可迅速提供最适合安装条件的天线。

■Features

- Very small and thin, omni-directional antenna.
- Due to its compact size, suitable for equipment like cellular phone with a limited mounting space.
- Suitable for card shaped equipment due to its low profile.
- Wide frequency band allows a big margin to cover the required range even in case of center frequency shift with mounting condition and other environmental factors.
- By applying series of item with certain step of center frequency, it is easy to provide the most suitable antenna for your application quickly.

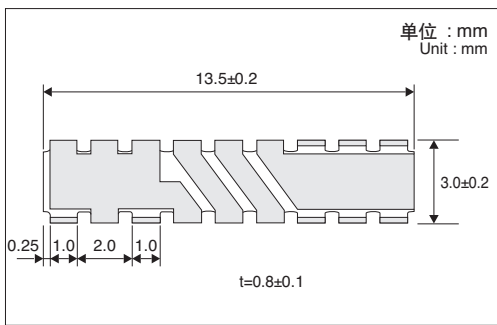
■用途

- PHS、DECT等

■Applications

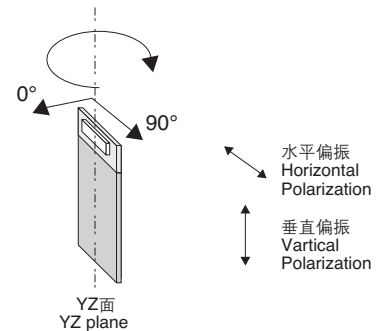
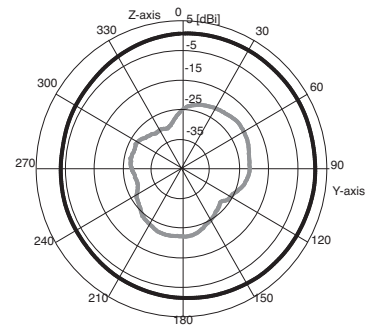
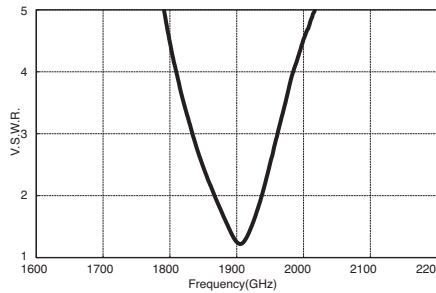
- PHS, DECT, etc

■形状・尺寸 Dimensions



■AHD1403-191ST01的特性

Characteristics of AHD1403-191ST01



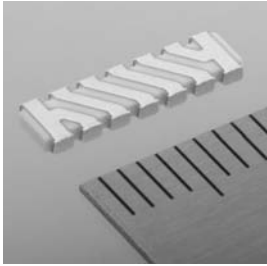
\*上述特性为典型特性，并非保证特性。

\*These characteristics are not guaranteed ones, but typical ones.



用于950MHz带 For 950MHz Band

●AMD1103-ST01



■特点

- 小型、薄型天线
  - 高增益
  - 全向性
  - 利用外部调整电路，可调节适用频带
- AMD1103-ST01 : 400MHz~1000 MHz  
(例)430 MHz、868MHz、915MHz、950MHz

■用途

- 智能电表，有源标签等

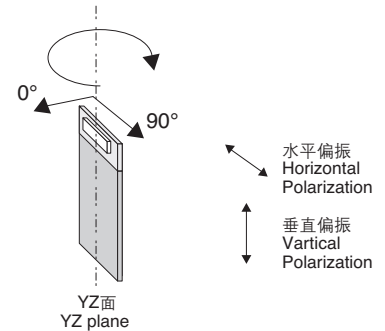
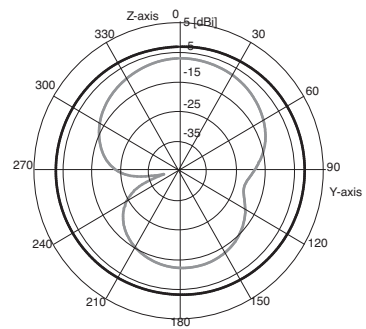
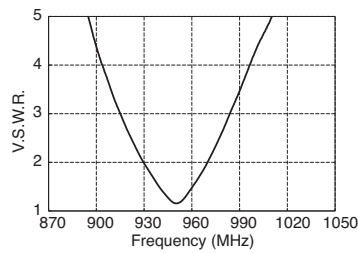
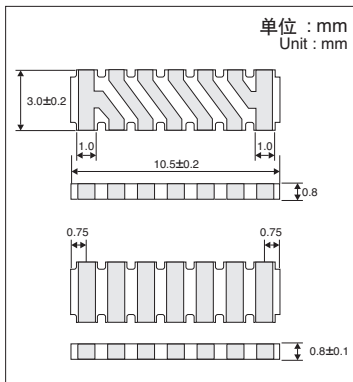
■Features

- Very small
  - High gain
  - Omini-directional
  - With an external tuning circuit, the adjustment to an application frequency range is possible.
- AMD1103-ST01 : 400 MHz~1000 MHz.  
(For example)430 MHz、868MHz、915MHz、950MHz

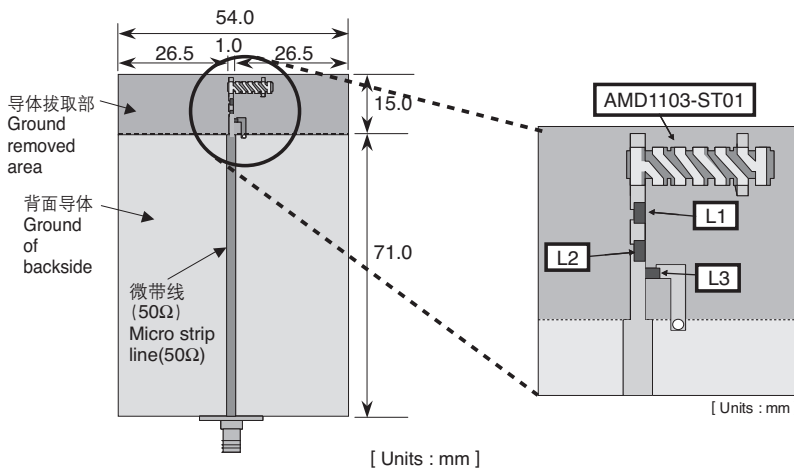
■Applications

- Smart Meter, Active Tag, etc

■形状・尺寸 Dimensions ■V.S.W.R.的特性及其放射特性(参考) 950MHz调整 V.S.W.R. & radiation characteristics (Reference) : 950 MHz



\*上述特性为典型特性，并非保证特性。  
\*These characteristics are not guaranteed ones, but typical ones.

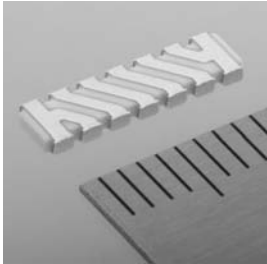


※本公司试验电路板调整实例

fc[MHz]	电感 [nH]		
950	L1	L2	L3
	11	33	6.8

用于915MHz带 For 915MHz Band

●AMD1103-ST01



■特点

- 小型、薄型天线
- 高增益
- 全向性
- 利用外部调整电路，可调节适用频带  
AMD1103-ST01：400MHz~1000 MHz  
(例)430 MHz、868MHz、915MHz、950MHz

■用途

- 销往北美的无线设备

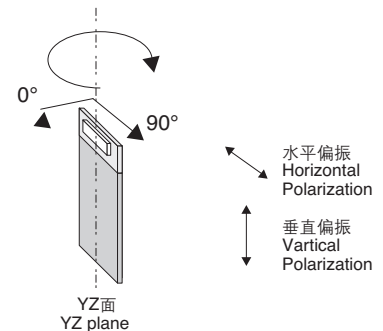
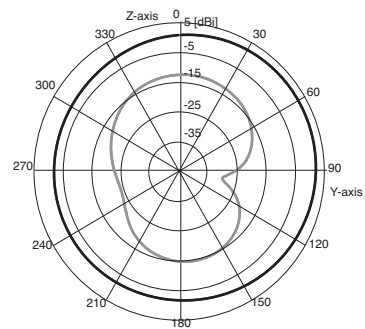
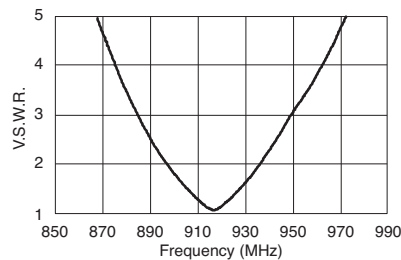
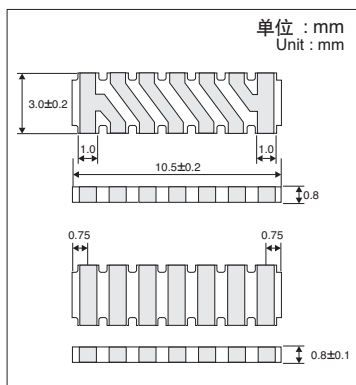
■Features

- Very small
- High gain
- Omini-directional
- With an external tuning circuit, the adjustment to an application frequency range is possible.  
AMD1103-ST01：400 MHz~1000 MHz.  
(For example)430 MHz、868MHz、915MHz、950MHz

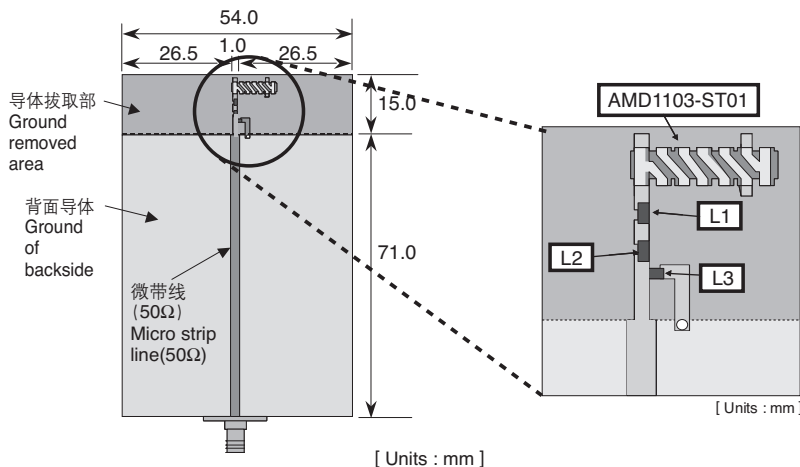
■Applications

- Wireless equipment for North America, etc

■形状・尺寸 Dimensions ■V.S.W.R.的特性及其放射特性(参考)915MHz调整 V.S.W.R. & radiation characteristics (Reference) : 915 MHz



\*上述特性为典型特性，并非保证特性。  
\*These characteristics are not guaranteed ones ,but typical ones.

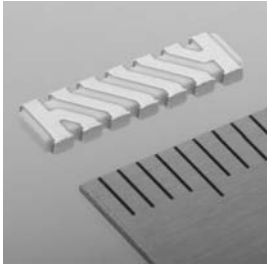


※本公司试验电路板调整实例

fc[MHz]	电感 [nH]		
915	L1	L2	L3
	8.7	39	7.5

## 用于868MHz带 For 868MHz Band

### ●AMD1103-ST01



#### ■特点

- 小型、薄型天线
- 高增益
- 全向性
- 利用外部调整电路，可调节适用频带  
AMD1103-ST01：400MHz~1000 MHz  
(例)430 MHz、868MHz、915MHz、950MHz

#### ■用途

- 销往欧洲的无线设备

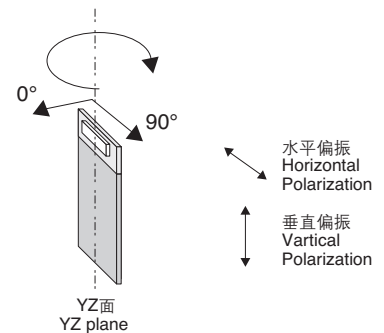
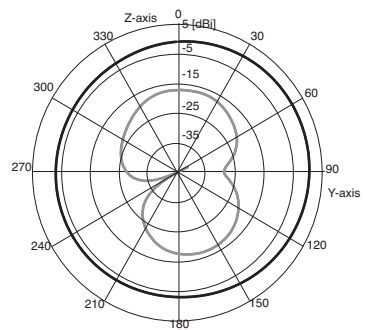
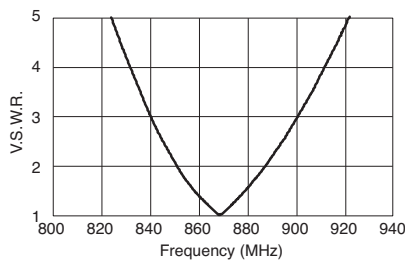
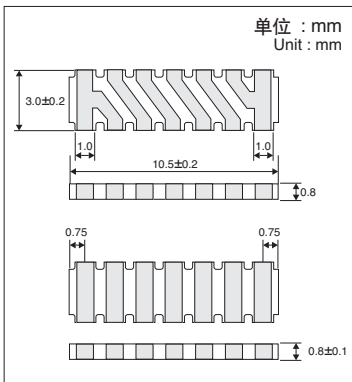
#### ■Features

- Very small
- High gain
- Omini-directional
- With an external tuning circuit, the adjustment to an application frequency range is possible.  
AMD1103-ST01 : 400 MHz~1000 MHz.  
(For example)430 MHz、868MHz、915MHz、950MHz.

#### ■Applications

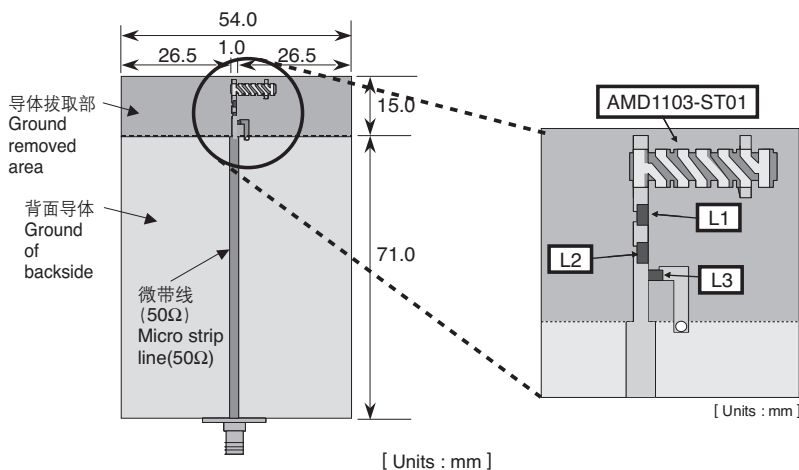
- Wireless equipment for Europe, etc

### ■形状・尺寸 Dimensions ■V.S.W.R.的特性及其放射特性(参考) 868MHz调整 V.S.W.R. & radiation characteristics (Reference) : 868 MHz



\*上述特性为典型特性，并非保证特性。

\*These characteristics are not guaranteed ones, but typical ones.

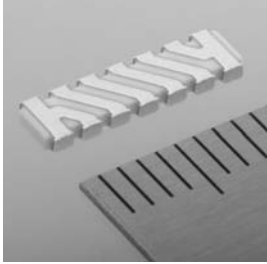


※本公司试验电路板调整实例

fc [MHz]	电感 [nH]		
868	L1	L2	L3
	4.3	47	8.2

用于430MHz带 For 430MHz Band

●AMD1103-ST01



■特点

- 小型、薄型天线
- 高增益
- 全向性
- 利用外部调整电路，可调节适用频带  
AMD1103-ST01：400MHz~1000 MHz  
(例)430 MHz、868MHz、915MHz、950MHz

■用途

- 遥测仪(工业用、医疗用)、遥控器、数据通信、无线开关系统

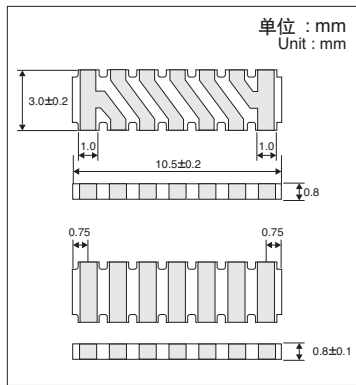
■Features

- Very small
- High gain
- Omini-directional
- With an external tuning circuit, the adjustment to an application frequency range is possible.  
AMD1103-ST01 : 400 MHz~1000 MHz.  
(For example) 430 MHz、868MHz、915MHz、950MHz.

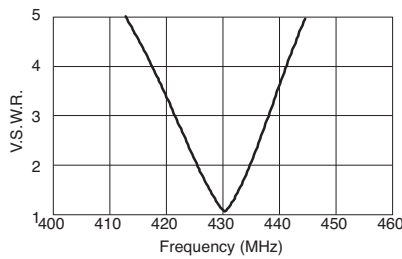
■Applications

- Telemeter, Telecontroller, Data communication, etc

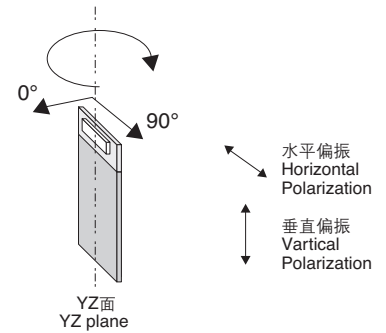
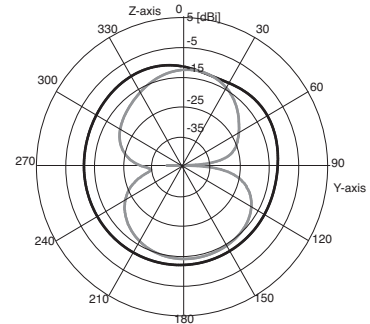
■形状・尺寸 Dimensions



■V.S.W.R.的特性及其放射特性(参考) 430MHz调整

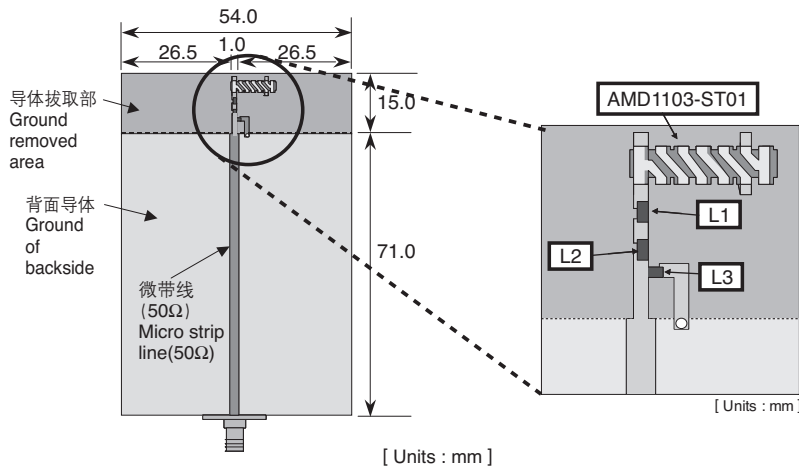


■V.S.W.R. & radiation characteristics (Reference) : 430MHz



\*上述特性为典型特性，并非保证特性。  
\*These characteristics are not guaranteed ones, but typical ones.

贴片天线  
CHIP ANTENNAS

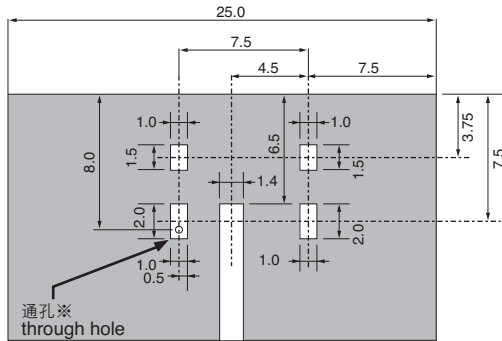


※本公司试验电路板调整实例

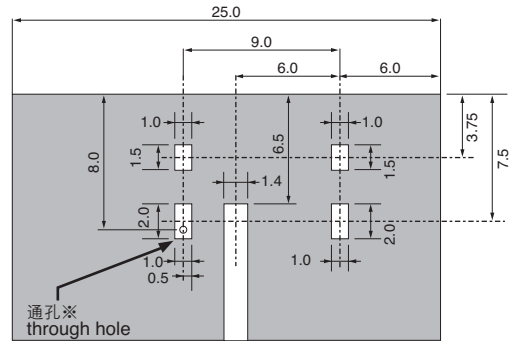
fc [MHz]	电感 [nH]		
430	L1	L2	L3
	30	220	16

## 推荐焊盘布局(参考) Recommended Land Pattern (Reference)

电极图形(主板表面): AHD1103-244ST01  
Land pattern (Surface of the Substrate)

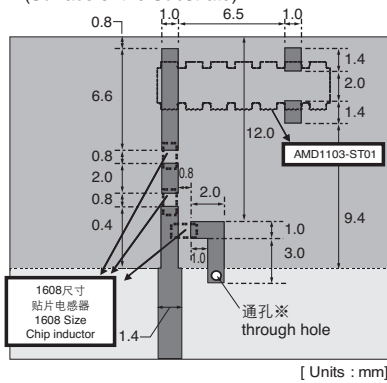


电极图形(主板表面): AHD1403-244ST01  
Land pattern (Surface of the Substrate)

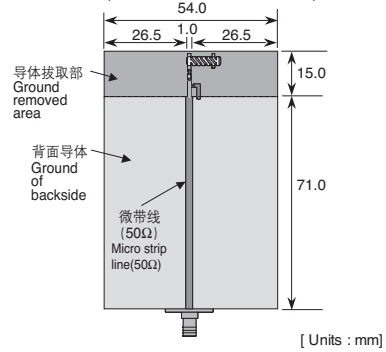


※通过通孔(Ø0.4mm)将表面焊盘与背面GND连接。  
※Connection to ground pattern via through hole (Ø0.4mm) recommended.

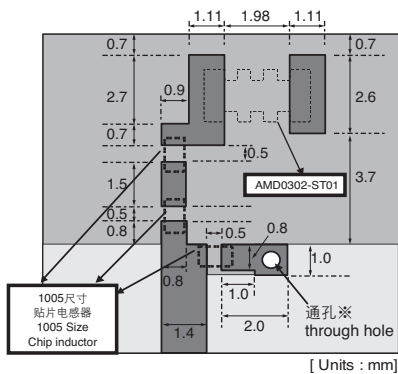
电极图形(主板表面): AMD1103-ST01  
Land pattern (Surface of the Substrate)



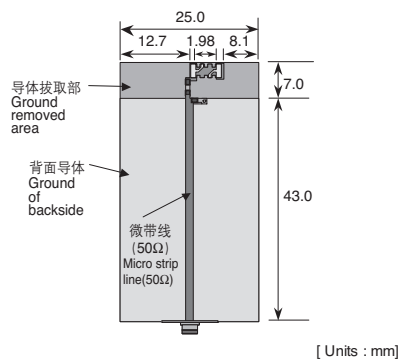
底板全图(主板表面): AMD1103-ST01  
Evaluated board (Surface of the Substrate)



电极图形(主板表面): AMD0302-ST01  
Land pattern (Surface of the Substrate)

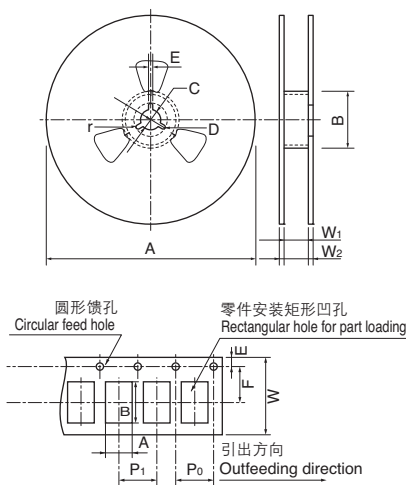
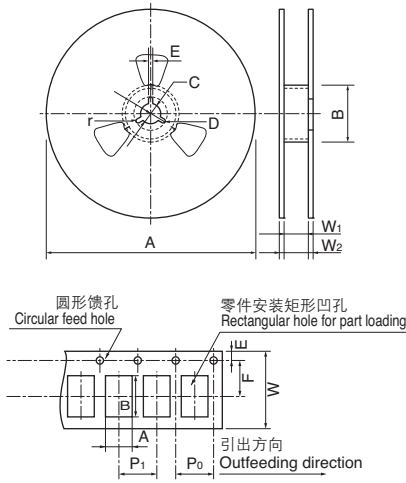



底板全图(主板表面): AMD0302-ST01  
Evaluated board (Surface of the Substrate)



单位: mm  
Unit: mm

## ■ 包装形状 Packing form

包装记号 Packing code	型号 Part number	包装数量 Packing Qty.	包装形状 Packing form																																																					
T	AHD1403 AHD1103 AMD1103	4,000		<table border="1"> <thead> <tr> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>W<sub>1</sub></th> <th>W<sub>2</sub></th> <th>r</th> </tr> </thead> <tbody> <tr> <td>ø330 +0 -3</td> <td>ø80 +1 -0</td> <td>ø13.0 ±0.2</td> <td>R10.5 ±0.4</td> <td>2.0 ±0.5</td> <td>24.4 ±0.6</td> <td>30.4 ≥</td> <td>0.5</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>适用</th> <th>A</th> <th>B</th> <th>E</th> <th>F</th> <th>P0</th> <th>P1</th> <th>W</th> <th>安装孔 Loading hole</th> </tr> </thead> <tbody> <tr> <td>AHD1403</td> <td>3.3 ±0.1</td> <td>13.8 ±0.1</td> <td>1.75 ±0.1</td> <td>11.5 ±0.1</td> <td>4.0 ±0.1</td> <td>8.0 ±0.1</td> <td>24 ±0.3</td> <td>凹形方孔 Rectangular hole</td> </tr> <tr> <td>AHD1103</td> <td>3.3 ±0.1</td> <td>10.8 ±0.1</td> <td>1.75 ±0.1</td> <td>11.5 ±0.1</td> <td>4.0 ±0.1</td> <td>8.0 ±0.1</td> <td>24 ±0.3</td> <td>凹形方孔 Rectangular hole</td> </tr> <tr> <td>AMD1103</td> <td>3.3 ±0.1</td> <td>10.8 ±0.1</td> <td>1.75 ±0.1</td> <td>11.5 ±0.1</td> <td>4.0 ±0.1</td> <td>8.0 ±0.1</td> <td>24 ±0.3</td> <td>凹形方孔 Rectangular hole</td> </tr> </tbody> </table>	A	B	C	D	E	W <sub>1</sub>	W <sub>2</sub>	r	ø330 +0 -3	ø80 +1 -0	ø13.0 ±0.2	R10.5 ±0.4	2.0 ±0.5	24.4 ±0.6	30.4 ≥	0.5	适用	A	B	E	F	P0	P1	W	安装孔 Loading hole	AHD1403	3.3 ±0.1	13.8 ±0.1	1.75 ±0.1	11.5 ±0.1	4.0 ±0.1	8.0 ±0.1	24 ±0.3	凹形方孔 Rectangular hole	AHD1103	3.3 ±0.1	10.8 ±0.1	1.75 ±0.1	11.5 ±0.1	4.0 ±0.1	8.0 ±0.1	24 ±0.3	凹形方孔 Rectangular hole	AMD1103	3.3 ±0.1	10.8 ±0.1	1.75 ±0.1	11.5 ±0.1	4.0 ±0.1	8.0 ±0.1	24 ±0.3	凹形方孔 Rectangular hole
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B	全产品 All types	100	聚乙烯袋 Poly bag																																																					

## ■ 使用注意事项 Precautions

- 适用温度范围  
使用温度范围: -40°C ~ +85°C  
保存温度范围: -40°C ~ +85°C
- 操作处理时的注意  
本产品为陶瓷产品, 施加过度的冲击或负荷可能会损坏元件。  
单体及基板搭载后的操作处理和运输等应加以充分注意。
- 保管方法  
请在密封状态(盖带未开封状态)在保管于恒温恒湿场所。若保管在以下环境中, 可能会导致产品特性劣化, 请加以注意。
  - 特殊气体环境(SO<sub>x</sub>、NO<sub>x</sub>、Cl<sub>2</sub>、NH<sub>3</sub>等)
  - 多尘场所、湿气大易结露的场所

请在购入后3个月内使用。另外, 盖带开封后应立即使用。  
保管期超过3个月时, 请在使用前确认可焊性。

※推荐保管条件  
温度: -10°C ~ +40°C  
湿度: 15%R.H ~ 85%R.H

- Operating temperature range  
Operating temperature range: -40°C ~ +85°C  
Storage temperature range: -40°C ~ +85°C
- Handling  
Excessive stress or mechanical shock may damage to products, therefore, please be careful in handling or transporting products and assemblies with this product.
- Storage  
Products should be stored as it packaged (as sealed up) under normal temperature and humidity. To avoid degradation or destruction of products, please do not store under conditions below.
  - In an atmosphere containing corrosive gas (SO<sub>x</sub>, NO<sub>x</sub>, Cl<sub>2</sub>, NH<sub>3</sub> etc.)
  - Dusty Place
  - Humid place, where water condenses

Stored products should be used within 3 months of receipt (If once the seal of covertape is broken, please use immediately).  
If this period is exceeded please verify solderability of products.

[Recommended storage condition]  
Temperature: -10°C ~ +40°C  
Humidity: 15%R.H ~ 85%R.H

型号 Part number	焊接条件 Soldering conditions
CSA10 CSA20 CSA30 CSZ20 CSZ30 CSA70 CDA70  LFA10 ※1 LCA10 ※1 LCA20 ※1 LFA20 LFA30 LFA14 ※1 LCA14 ※1 LCG14 ※1 LFA24 ※1 LFH24 ※1 LCA24 ※1 LFB10 ※1 LFB20 LFB30 LZA05 LZA10 CMA12 ※1 CMB12 ※1	<p><b>推荐温度曲线 Recommended Temperature Profile</b></p> <p>流体焊接 Flow soldering conditions 共晶焊接时 Eutectic Solder</p> <p>无铅焊接时 Lead free Solder</p> <p>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) <math>\Delta T</math>应在100°C以内。 3) 焊接后切勿迅速冷却，而应缓慢冷却。</p> <p>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.</p> <p>回流焊接 Reflow soldering conditions 共晶焊接时 Eutectic Solder</p> <p>无铅焊接时 Lead free Solder</p> <p>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) <math>\Delta T</math>应在100°C以内。 3) 焊接后切勿迅速冷却，而应缓慢冷却。</p> <p>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.</p> <p>※1 仅可进行回流焊接 ※2 GA13、GA20、GH13及GH20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。</p> <p>※1 Reflow only ※2 GA13,GA20,GH13,GH20 are Tin plated only, and flow only. Soldering method of the other products refer to the individual specification.</p>
TS03 TC03 TH03 TN05 TC05 TH05 TD05 TN11 TH11 TD11 TN10 TC10 TN20 TC20 TH20 MN18 MH18 GA13 GA20 GH13 GH20	<p>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) <math>\Delta T</math>应在100°C以内。 3) 焊接后切勿迅速冷却，而应缓慢冷却。</p> <p>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.</p>
AHD1403 ※1 AHD1103 ※1 AMD1103 ※1 AMD0302 ※1	<p>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) <math>\Delta T</math>应在100°C以内。 3) 焊接后切勿迅速冷却，而应缓慢冷却。</p> <p>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.</p>

### 【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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