Dersonic®
德信立業 創新開拓

压敏电阻器规格承认书
APPROVAL SPECIFICATION FOR VARISTORS (ZnO)

客户 CUSTOMER	立创
客户料号 CUSTOMER P/N	
客户规格描述 CUST. DESCRIPTION	
规格描述 DESCRIPTION	14D331K/F7.5/直脚/L24/环氧(蓝)/CW
产品编码 PART NUMBER	RM14D331KD1IECW0

日期 DATE	2020/8/22	文件编号 DOC. NO.	DEC-SA-WI007

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批 准 APPROVED BY	审核 CHECK BY	制订 FORMULATE BY	批 准 APPROVED BY	审核 CHECK BY
彭少雄	彭少雄	吴丹		

东莞市德尔创电子有限公司 样品承认章

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文件修改摘要
DOCUMENT MODIFICATION SUMMARY

序 No.	变更日期 Date	版本 Versions	变更内容 Change contents	制订 Formulate by
1	2019/3/12	A/0	承认书做成 Approval specifications was made	吴成爱
2	2020/5/15	A/1	增加UL高温125°C认证的说明 Instructions for adding UL high temperature 125°C certification	麦琼方
3	2020/6/12	A/2	增加耐浪涌冲击/附录Q等类别 Add models such as withstanding surge / Appendix Q type	麦琼方
4	2020/8/6	A/3	根据TÜV要求，产品上打印的TÜV标志由TÜV变更为TÜV TÜV requires that the TÜV logo printed on the product is changed from TÜV to TÜV	麦琼方
5	2020/8/15	A/4	CQC与TÜV通过125°C认证，另外，TÜV证书号码由B 16 09 96835 001变更为B 096835 0001 CQC and TÜV have passed 125°C certification. In addition, the TÜV certificate number has been changed from B 16 09 96835 001 to B 096835 0001	麦琼方

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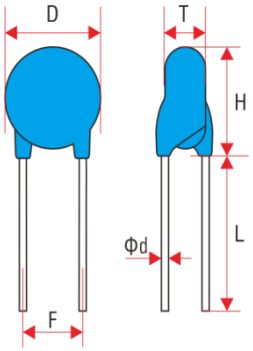
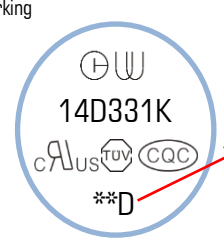


印字
Marking



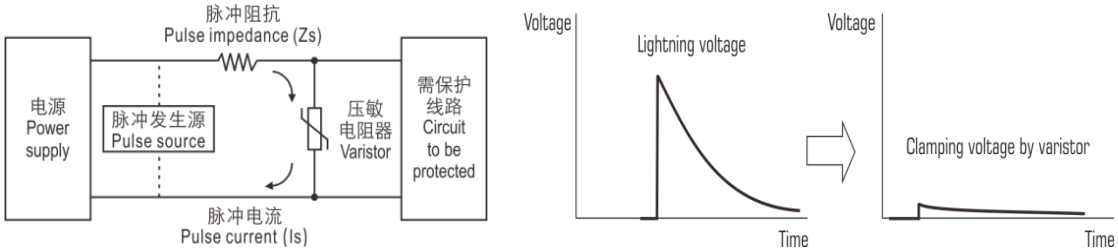
最后一排标志是内部识别与生产周期码。
The last row of marks is the production cycle code and internal identification.
由于TÜV要求，原标志TÜV变更为TÜV，在变更的交替期间两种标志将会同时存在。
TÜV requires that the original TÜV logo be changed to TÜV. and both marks will exist at the same time during the alternation period.

产品编码 Part number		RM14D331KD1IECW0
客户料号 Customer P/N		
最大连续工作电压 Max continuous operating voltage		AC210V (max) / DC275V (max)
压敏电压, V_N Varistor voltage, V_N		330V±10% @ 1mA 30ms
标称脉冲电流, Ip Nominal pulse current, Ip		50A @ 8/20μs
最大抑制电压, V_C Maximum clamping voltage, V_C		545V (max) @ Ip
耐冲击电流 Withstanding surge current	最大脉冲电流 Maximum pulse current	4500A (1 time) @ 8/20μs
	重复脉冲电流 Repetitive pulse current	1500A (10 times), @ 8/20μs (90 sec. interval)
	冲击寿命 Impulse life	150A (10 000 times) @ 8/20μs (10 sec. interval)
	方波电流 Square wave current	50A (1 time) @ 2ms 100A (1 time) @ 10/1000μs
最大耐受能量 Maximum energy		85J @ 10/1000μs
额定功率 Rated power		0.6W
最大漏电流 Maximum leakage current		20μA @ 75% V_N
最大电容量 Maximum capacitance		610pF @ 1kHz 1.0Vrms
压敏电压温度系数 Temperature coefficient of varistor voltage		0 to -0.05 %/°C max.
工作温度范围 Operating temperature range		-40°C～+85°C
储存温度范围 Storage temperature range		-40°C～+125°C

尺寸 Dimensions	D (Diameter): 16.5 mm max	F (Lead spacing): 7.5mm±0.8mm
	T (Thickness): 4.2 mm max	L (Lead length): 24mm±4.0mm
	H (Heitht): 20 mm max	ød (Lead diameter): 0.75mm±0.10mm

2. 概述
INTRODUCTION

压敏电阻是一种具有在一定的电压条件下支持电流急速流出的电压-电流特性的产品。
A varistor has the volt-ampere characteristics in which current suddenly starts to flow through the device at a certain voltage.
压敏电阻的作用：保护在电子线路中的电子元器件免受过电压的影响。如下图所示，压敏电阻并联在电路中起保护作用。当有脉冲(脉冲电流Is：由脉冲电压Vs和阻抗Zs决定)施加在电路上时，脉冲电流（Is）限制脉冲电压在压敏电阻的限制电压Vc之内。
The varistors are used to protect components in electronic and electric circuits from overvoltage. As shown in following figure, a varistor is inserted in parallel with a circuit to be protected. When a pulse is applied to the circuit, pulse current Is, which is determined by pulse voltage Vs and pulse impedance Zs, flows to limit the pulse voltage to the varistor limit voltage Vc.



压敏电阻器对脉冲的吸收
PULSE ABSORPTION BY VARISTOR

相互的关系可以用下面的公式来解释：
The relation can be expressed by the equations as follows:

$$Vs = Is \times Zs + Vc$$

$$\therefore\ Vc = Vs - Is \times Zs$$

因为Vs远远大于Vc，脉冲电流Is可以用以下公式求得
The pulse current Is are easily obtained by the following equation because of Vs much larger than Vc.

$$Is \approx Vs \div Zs$$

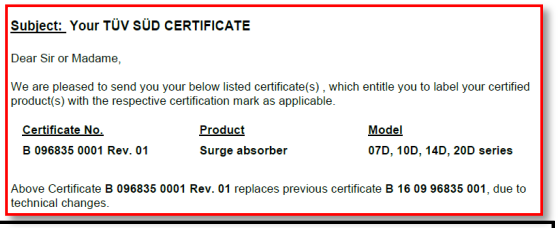
所以，由于可承受电压大于最大的限定电压，电路可以长时间的免于脉冲电压的损坏。
Thus, the circuit can be protected from being damaged by pulse voltages as long as it has withstand voltage larger than the maximum limit voltage.
由于吸收异常电压和电流脉冲的特性，压敏电阻可非常高效的保护电子器件。
Owing to the characteristic, the varistors are extremely effective as protecting devices of electronic and electric equipment by absorption of abnormal voltages and lightening pulses.

3. 基本特性
GENERAL CHARACTERISTIC

■ 符合RoHS 2.0、REACH及无卤
Comply with rohs 2.0, reach, halogen-free available.

■ 安规认证
Safety certification

TÜV SÜD回复我公司证书号码变更原因(截图):
TÜV SÜD reply to our certificate number reason for change (screenshot):



Subject: Your TÜV SÜD CERTIFICATE

Dear Sir or Madame,

We are pleased to send you your below listed certificate(s) , which entitle you to label your certified product(s) with the respective certification mark as applicable.

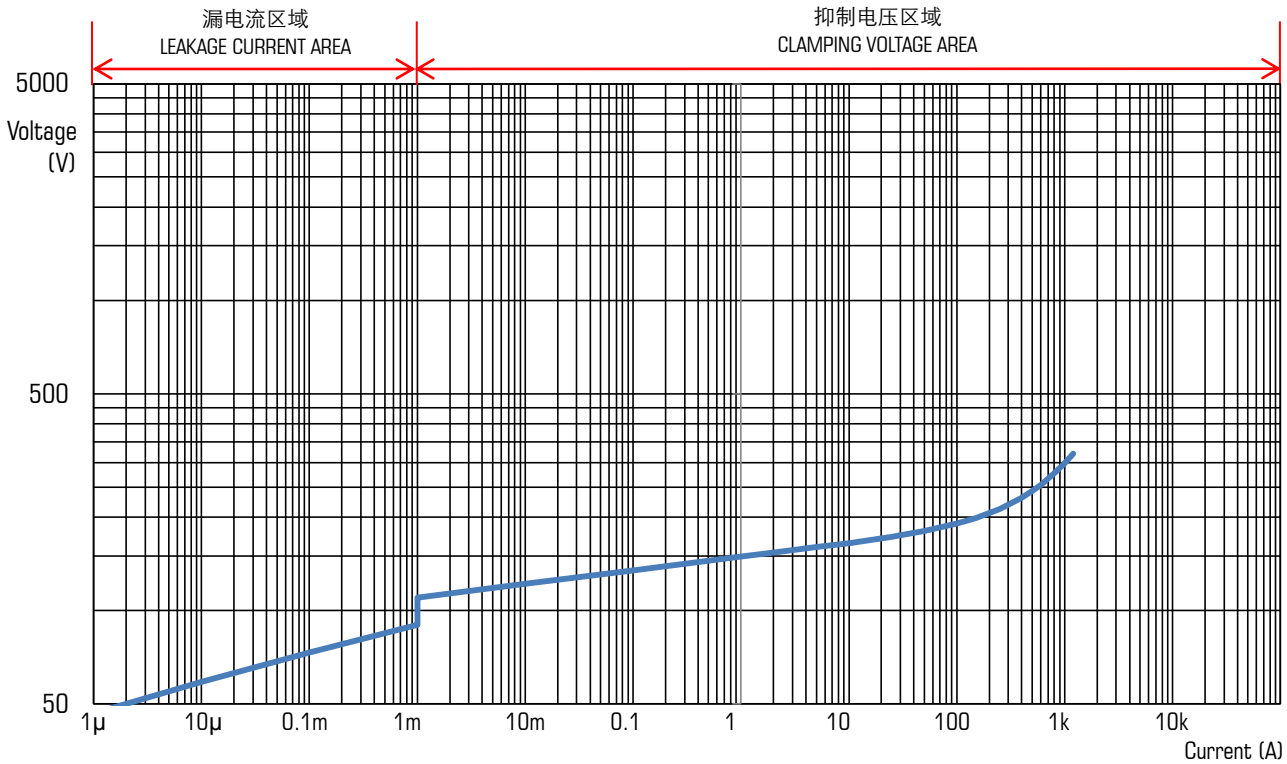
Certificate No.	Product	Model
B 096835 0001 Rev. 01	Surge absorber	07D, 10D, 14D, 20D series

Above Certificate **B 096835 0001 Rev. 01** replaces previous certificate **B 16 09 96835 001**, due to technical changes.

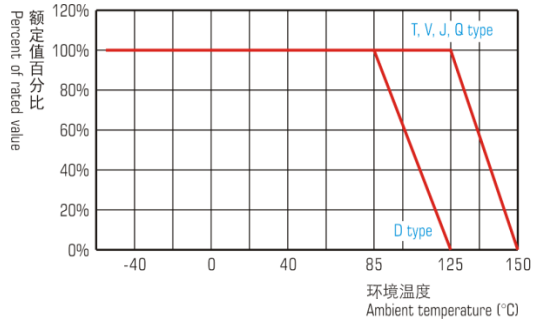
认证机构 CERTIFICATE AUTHORITY	认证标准 APPROVAL STANDARD	证书编号 CERTIFICATE NO.	认证范围 CERTIFICATION RANGE		
			规格 SPECS	压敏电压 VARISTOR VOLTAGE	最大连续交流电压 MAXIMUM CONTINUOUS OPERATING VOLTAGE A.C.
CQC	GB/T 10193-1997 GB/T 10194-1997	CQC14001104814	07D	18V-820V	11VAC-510VAC
	GB 4943.1-2011 GB 8898-2011 GB/T 10193-1997 GB/T 10194-1997	CQC16001149384	10D	18V-1100V*	11VAC-680VAC
		CQC16001149385	14D	18V-1800V*	11VAC-1000VAC
		CQC16001149386	20D	18V-1800V*	11VAC-1000VAC
TÜV SÜD	EC 61051-1:2018 IEC 61051-2:1991/A1:2009 IEC 61051-2-2:1991	B 16 09 96835 001 Change to B 096835 0001**	07D	18V-820V	10VAC-510VAC
			10D	18V-1100V	10VAC-680VAC
			14D	18V-1800V	10VAC-1000VAC
			20D	18V-1800V	10VAC-1000VAC
UL (cUL)	UL 1449 (4th edition)	E485399	07D	18V-820V	11VAC-510VAC
			10D	18V-1100V	11VAC-680VAC
			14D	18V-1800V	11VAC-1000VAC
			20D	18V-1800V	11VAC-1000VAC

*: 18V~360V仅适用于GB/T 10193-1997, GB/T 10194-1997
**: Additional test for 10D, 14D, 20D series: Annex Q of IEC 60950-1:2005/A2:2013, clause 14.13 of IEC 60065:2014 and clause G.8.1 of IEC 62368-1:2018.

■ 典型的14D331K抑制电压特性曲线(供参考)
Typical 14D331K clamping voltage characteristic curve (for reference)



■ 工作温度降额曲线(见下图)
Operating temperature derating curve (see fig below)



标准型85°C到125°C降额系数为2.5%/°C
D type: 85°C to 125°C derating factor: 2.5% per °C

D type: 标准型
Standard type
T type: 高温型
High temperature type
V type: 高能型
High energy type
J type: 耐浪涌冲击型
Withstanding surge type
Q type: 附录Q型
Annex Q (IEC 60950-1, withstanding 6kV/3kA combination wave testing) type

请注意：额定特性包括最大连续工作电压、耐冲击电流、能量耐量及额定功率，降幅2.5%/°C
Please note: rated characteristic includes maximum continuous operating voltage, withstanding surge current, maximum energy and rated dissipation power, 2.5%/°C reduction.

举例说明，当一个压敏电阻器(07D471K)使用于环境温度为95°C时，其超出规定的使用温度10°C。此时性能降额如下表所示：
For example, when a varistor (07D471K) is used at an ambient temperature of 95°C, it exceeds the specified operating temperature of 10°C. The performance derating is shown in the following table:

项次 Item	特性 Characteristic	工作温度范围内性能 Performance within operating temperature range	95°C时性能 Performance within 95°C
1	最大连续工作电压 Max continuous operating voltage	AC300Vrms DC385V	AC225Vrms (75%×AC300Vrms) DC289V (75%×DC385V)
2	最大脉冲电流 Max pulse current	1200A (1 time)	900A (75%×1200V)
3	重复脉冲电流 Repetitive pulse current	400A (10 times)	300A (75%×400V)
4	方波电流 Square wave current	12.5A (2ms) 25A (10/1000μs)	2ms: 9.38A (75%×12.5A) 10/1000μs: 18.75A (75%×25A)
5	最大耐受能量 Maximum energy	29J	21.8J (75%×29J)
6	额定功率 Rated power	0.25W	0.19W (75%×0.25W)

4. 名词解释
DEFINITIONS

1) 最大连续工作电压：在环境温度25°C下，允许连续施加在压敏电阻器上的最大工频正弦电压有效值Uac(总谐波失真小于5%)或直流电压值Udc。
Maximum continuous operating voltage: maximum ac RMS voltage uac or maximum dc voltage udc which can be applied continuously at a temperature of 25°C. Uac shall be a substantially sinusoidal voltage (less than 5% total harmonic distortion).
2) 压敏电压：直流参考电流流过压敏电阻器时，压敏电阻器两端的直流电压值。
Varistor voltage: dc voltage across the varistor when the dc reference current flows through the varistor.
3) 标称脉冲电流：是一个电流峰值，它是以每分钟2次的方式用8/20μs脉冲电流冲击100次，压敏电阻器可以通过的电大峰值电流的1/10。
Nominal pulse current: it is a current peak value. It is pulsed 100 times with 8/20μs pulse current in 2 times per minute, and the varistor can pass 1/10 of the peak current.
4) 抑制电压：是指在标准大气条件下，压敏电阻器中通过标称脉冲电流时，其两端呈现的电压峰值。
Clamping voltage: refers to the voltage peak appearing between the two terminals of a varistor when passing a nominal pulse current under standard atmospheric conditions.

5) 耐冲击电流：压敏电阻器允许通过的规定波形的每个脉冲的最大电流值。
Withstanding surge current: the maximum current value of each pulse of the specified waveform that the varistor is allowed to pass.

6) 能量耐量：能被压敏电阻器吸收的指定波形的最大单个脉冲能量，除非另有规定，否则应使用2ms脉冲或10/1000μs脉冲。
Maximum energy: the maximum single pulse energy of the specified waveform that can be absorbed by the varistor. Unless otherwise specified, 2ms pulses or 10/1000μs pulses should be used.

7) 额定功耗：在25℃的环境温度下的最大允许功耗。
Rated power: the maximum allowable power dissipation of varistors at an ambient temperature of 25°C.

8) 漏电流：在25℃或规定的其他温度下，施加最大直流电压时，通过压敏电阻器中的电流。
Leakage current: the current through the varistor at the maximum dc voltage applied at 25°C or other specified

5. 产品编码

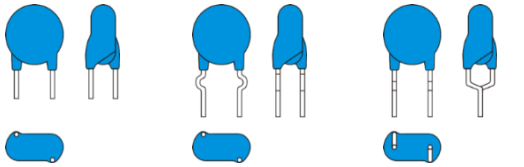
PART NUMBER

RM	**14**	**D**	**331**	**K**	**D**	**1**	**I**	**E**	**CW0**
系列 Series	标称直径 Nominal diameter	形状及等级 Shape and grade	压敏电压 Varistor voltage	误差 Tolerance	脚距 Leads spacing	脚型 Leads style	编带包装或散装脚长 Taping packing or Leads length of bulk	包封材质 Coating material	标志 Marking

序号 No.	名称 Field name	表达内容 Expression
1	系列 Series	RM: 压敏电阻器 ZnO (Zinc oxide) Varistors
2	标称直径 Nominal diameter	14: 14mm
3	形状 Shape	D: 圆形 Disc
4	压敏电压 Varistor voltage	331: 330V
5	误差 Tolerance	K: ±10%
6	脚距 Leads spacing	D: F=7.5mm
7	脚型 Leads style	1: 直脚 Straight Leads
8	编带包装或散装脚长 Taping packing or Leads length of bulk	I: 散件包装，脚长(L)=24mm Bluk packing, Lead length (L)=24mm
9	包封材质 Coating material	E: 环氧(蓝) Epoxy (Blue)
10	标志 Marking	CW0: 印Ⓣ Ⓦ商标 Printed Ⓣ Ⓦ trademark

注：最后一码为T时，表示高温(125°C)型，
V时，表示高能型，
J时，表示耐浪涌冲击型，
Q时，表示附录Q(6KV/3KA)型

Note: When the last code of the P/N is T, it's high temperature (125°C) type
V, it's high energy type
J, it's withstanding surge type
Q, it's appendix Q (IEC 60950-1, 6KV/3KA) type



直脚 Straight Leads　外弯脚 Outside kink Leads　平行脚 Vertical kink Leads

6. 测量与试验
MEASUREMENT AND TESTING

如无特殊需要，压敏电阻器应在下列环境条件下进行试验：
If there is no special need, varistor measurement and testing should be conducted under the following environmental conditions:

温度 Temperature	相对湿度 Relative humidity	大气压力: Atmospheric pressure:
25°C±5°C	30%～70%	86kpa～106kpa

序号 No.	检验项目 Item		要求 Specification	试验方法 Testing method
1	外观与尺寸 Appearance And dimension		外观形状没有明显的缺点，尺寸在标准范围内。 No marked defect on appearance form and dimensions are within specified range.	压敏电阻器必须用目视检查其明显的缺点。 The varistors should be visually inspected for evidence of defect. 尺寸用游标卡尺测量。 Dimensions should be measured with slide calipers.
2	标志 Marking		清晰易于识别。 To be easily legible.	目视检查。 The capacitor should be visually inspected.
3	抑制电压 Clamping voltage		满足额定值 To meet the specified value.	使用波形为8/20μs的标称脉冲电流施加在压敏电阻器引出端上，同时测试抑制电压的峰值。 A nominal pulse current of 8/20μs waveform was applied to the varistor terminals and the clamping voltage peak was tested.
4	压敏电压 Varistor voltage		在误差范围内。 Within specified tolerance.	将压敏电阻器固定在无锈蚀的夹具上，按"规格表"规定的条件进行测试压敏电阻器引出端的电压。 The varistor is fixed on the fixture without rust, and the voltage of the varistor terminal is tested according to the conditions specified in the "Data sheet".
5	电容量 Capacitance		满足额定值 To meet the specified value.	在标准大气条件下，使用1kHz、1V的条件进行测量。 Measurement at 1kHz, 1V under standard atmospheric conditions
6	漏电流 Leakage current		满足额定值 To meet the specified value.	在25°C时施加75%的最大连续直流电压，测量其漏电流。 Apply a maximum continuous dc voltage of 75% to the varistor at 25°C and measure its leakage current.
7	电流冲击稳定性 Impulse testing stability	重复脉冲电流 Repetitive pulse current	试验过程中压敏电阻器应无击穿、闪络，外观不应有任何机械损伤 The varistor should have no breakdown or flashover during the test, and the appearance should not have any mechanical damage 冲击后，应在常温下恢复2h，测量压敏电压，其值相对于初始值的变化率应小于10% After the impulse, it should be stored at room temperature for 2 hours. Measure the varistor voltage. The rate of change should be less than 10% of the initial value.	在8/20μs波形下，对压敏电阻器施加10次重复脉冲电流，每个方向冲击各5次，相邻两次冲击的间隔为90s。 Under 8/20μs waveform, the varistor was subjected to 10 times of repetitive pulse current, and the impulses was 5 times in each direction. The interval between two adjacent impulses was 90 s.
		方波电流 Square wave current		对压敏电阻器施加1次方波电流冲击(2ms或者10/1000μs)的冲击，方向任意。 The varistor is subjected to a square wave current impulse (2ms or 10/1000μs), in any direction.
8	最大脉冲电流 Max pulse current			在8/20μs波形下，对压敏电阻器施加1次最大脉冲电流冲击，方向任意。 Under 8/20μs waveform, the varistor is subjected to a max pulse current impulse, in any direction.
9	耐电压 Withstand voltage		试验过程中压敏电阻器无击穿、电弧、闪络等现象，外观不应有任何机械损伤 The varistor should have no breakdown, arcing or flashover during the test, and the appearance should not have any mechanical damage.	首先，将压敏电阻器的端子拧在一起，然后将金属箔包住压敏电阻器离端子3-4mm的本体，接着将压敏电阻器插入盛着直径为1mm的金属球的容器中，最后施加2500V的电压60秒种。 First, the terminals of the varistor should be connected together. Then, a metal foil should be closely wrapped around the body of the varistor to the distance of about 3 to 4mm from each terminal. Then, the varistor should be inserted into a container filled with metal balls of about 1mm diameter. Finally, 2500v voltage is applied for 60 sec. Between the varisor lead wires and metal balls.

↘ 续上表
Continued on the table

序号 No.	检验项目 Item	要求 Specification	试验方法 Testing method
10	冲击寿命 Impulse life	试验后压敏电阻器外观不应有任何机械损伤，压敏电压变化率不应超过10% After the test, the appearance of the varistor should not have any mechanical damage, and the varistor voltage change rate should not exceed 10%	常室温下，将指定的脉冲电流间隔10秒接通10000次，在1小时至2小时时间段内测定其特性。 The change of varistor voltage shall be measured after the specified impulse current is applied 10000 times continuously with the interval of 10 seconds at room temperature.
11	最大能量 Maximum energy	满足额定值 To meet the specified value.	在10/1000μs电流波下，压敏电阻器能承受的最大能量。 The maximum energy that the varistor can absorb under the 10/1000μs current wave.
12	额定功率 Rated power	满足额定值 To meet the specified value.	在环境温度25℃下施加连续脉冲电流时，压敏电阻器可以耗散的最大平均功率。 Maximum allowable average power dissipation when subjected to the stress of successive impulses and at the temperature of 25℃.
13	压敏电压温度系数 Temperature coefficient of varistor voltage	满足额定值 To meet the specified value.	$\frac{V_{n2}-V_{n1}}{V_{n1}} \times 1/60 \times 100(\%/℃)$ 式中，V_{N1}是25℃下的压敏电压值，V_{N2}是85℃下的压敏电压值 Where V_{N1} is varistor voltage at 25℃ and V_{N2} is varistor voltage at 85℃
14	导线抗张强度 Terminal tensile strength	导线无折断，压敏电阻器无破损。 Lead wire should not be cut off. Varistor should not be broken.	固定压敏电阻器的本体，使压敏电阻器每支导线均承受10N(1.0mm导线直径为20N)垂直力，保持10±1秒钟。 Fix the body of the varistor and apply a tensile weight gradually to each lead wire in the radial direction of the capacitor up to 10N (1.0mm lead wire diameter is 20N) and keep it for 10±1 s.
15	导线抗折强度 Terminal bending strength	导线无折断，压敏电阻器无破损。 Lead wire should not be cut off. Varistor should not be broken.	压敏电阻器导线应承受5N(1.0mm导线直径为10N)重量，然后向外弯折成90°，然后回复到原来位置；接着往反方向弯折90°，再复原；弯折一次2-3秒钟。 Each lead wire should be subjected to 5N (1.0mm lead wire diameter is 10N) weight and then a 90° bend, at the point of egress, in one direction, return to original position, and then apply a 90° bend in the opposite direction at the rate of one bend in 2 to 3 s.
16	可焊性 Solderability of leads	导线必须有3/4以上的面积均匀附着焊锡。 Lead wire should be soldered with uniform coating on the axial direction over 3/4 of the circumferential direction.	将压敏电阻器的导线浸入焊料中2±0.5秒钟，浸入深度离导线根部1.5-2.0mm。 The lead wire of a varistor should be dipped into molten solder for 2±0.5 s. The depth of immersion is up to about 1.5 to 2.0mm from the root of lead wires. 焊锡温度：无铅焊锡（Sn-3Ag-0.5Cu）245±5℃ Temp. of solder: lead free solder (Sn-3Ag-0.5Cu) 245±5℃ 易溶解的H63号锡（Pb37/Sn63）235±5℃ H63 eutectic solder (Pb37/Sn63) 235±5℃
17	耐焊接热 Soldering effect	试验后压敏电阻器外观不应有任何机械损伤，压敏电压变化率不应超过5% After the test, the appearance of the varistor should not have any mechanical damage, and the varistor voltage change rate should not exceed 5%.	导线浸入离导线根部1.5-2.0mm处、锡温为260±5℃锡槽中10±1秒。试验后，压敏电阻器应在室温中恢复2小时。 The lead wires should be immersed in solder of 260±5℃ up to 1.5 to 2.0mm from the root of terminal for 10±1.0 s. After the test, the varistor should recover at room temperature for 2h.
18	振动 Vibration resistance	试验后压敏电阻器外观不应有任何机械损伤，压敏电压变化率不应超过5% After the test, the appearance of the varistor should not have any mechanical damage, and the varistor voltage change rate should not exceed 5%.	将压敏电阻器导线焊稳和调整振动频率范围为10-55Hz、总振幅为1.5mm，振动从10Hz到55Hz，然后再回到10Hz，大约一分钟。总时间六个小时，每两小时在相互垂直方向来回三次。 The varistor should be firmly soldered to the supporting lead wire and vibrated at a frequency range of 10 to 55Hz, 1.5mm in total amplitude, with about a 1 minute rate of vibration change from 10Hz to 55Hz and back to 10Hz. Apply for a total of 6h., 2h each in 3 mutually perpendicular directions.

↘ 续上表
Continued on the table

序号 No.	检验项目 Item	要求 Specification	试验方法 Testing method
19	耐湿负荷 Humidity loading	试验后压敏电阻器外观不应有任何机械损伤，压敏电压变化率不应超过10% After the test, the appearance of the varistor should not have any mechanical damage, and the varistor voltage change rate should not exceed 10%.	压敏电阻器保持在温度为40±2°C、相对湿度为90%-95%条件下施加最大连续交流电压500±12小时。 Apply the max continuous operating ac voltage for 500±12 h. At 40±2°c in 90% to 95% relative humidity. 试验结束后，压敏电阻器应在室温下恢复2小时。 After the test, the varistor should recover at room temperature for 2h.
20	高温负荷 High temperature loading	试验后压敏电阻器外观不应有任何机械损伤，压敏电压变化率不应超过10% After the test, the appearance of the varistor should not have any mechanical damage, and the varistor voltage change rate should not exceed 10%.	应给压敏电阻器施加最大连续交流电压，储存最高工作温度下1000±12小时。 The maximum continuous ac voltage should be applied to the varistor and stored at a maximum operating temperature of 1000 ±12 h 试验结束后，压敏电阻器应在室温下恢复2小时。 After the test, the varistor should recover at room temperature for 2 h.
21	温度循环 Temperature cycle	试验后压敏电阻器外观不应有任何机械损伤，压敏电压变化率不应超过10% After the test, the appearance of the varistor should not have any mechanical damage, and the varistor voltage change rate should not exceed 10%	温度循环试验按以下条件进行试验和测量 Temperature cycling shall be measured in the following test. Step 1 Temperature -40±2°C Time 30min Step 2 Temperature +85±2°C Time 30min 循环次数：5次 Cycle numbers: 5 cycles 试验结束后，压敏电阻器应在室温下恢复2小时。 After the test, the varistor should recover at room temperature for 2 h.
22	阻燃性 Passive flammability	火焰撤去后30秒内，燃烧应能自熄。 The burning of the sample shall be self-extinguishing within 30 s after removing the needle flame.	按[IEC 60695-11-5]对MOV进行针状火焰试验。火焰施加部位为电阻体样品的侧面，施加时间为5秒。 The MOV shall be subjected to the needle-flame test of [IEC 60695-11-5]. The needle-flame application shall be on the side surface of the samples for 5 s.

7. 安全注意事项
SAFETY PRECAUTIONS

使用压敏电阻器时，压敏电阻器周围条件（设备设计中的材料、环境、电源条件、电路条件等）发生异常时，则可能引发火灾、触电、烧伤、以及产品故障。
In case that a varistor is used, if an abnormality takes place because of peripheral conditions of the varistor(material, environments, power source conditions, circuit conditions, etc. In equipment design), fire, electric shock, burn, or product failure may be occur.
下列内容为使用时的相关注意事项，请认真确认后再行使用。如对未及事项有疑议，请速与我公司担当部门联系。
The precautions for this product are described below; understand the content thoroughly before usage. For more questions, contact us.

7.1. 严格遵守事项
Precautions to be strictly observed

7.1.1. 额定性能确认
Confirmation of performance ratings

请遵守压敏电阻器的最大连续工作电压，耐冲击电流、最大能量耐量、浪涌寿命、额定功率和操作温度范围等额定性能的规定，在规定范围内使用。
Use the varistor within its rated range of performance such as the maximum continuous operating voltage, withstanding surge current, maximum energy, impulse life, rated power and operating temperature range.
超出规定范围使用，则会造成压敏电阻器性能劣化，破坏元件，严重可引起压敏电阻器冒烟或起火。
If used outside the range, the varistor can be degrade and have element fracture, which may result in smoking and ignition.

7.1.2. 为避免意外现象发生，请采用如下对策
To avoid accidents due to unexpected phenomena, take the following measures

1) 压敏电阻器受损时，可能出现破碎飞散，因此要对集成产品加保护盖或外盒。
In the event of fracture of the varistor, its pieces may scatter; hence, put the case or cover of the set product in place.

2) 请勿安装在可燃物品（塑料电线、树脂合成物等）附近。若无法避免，请使用不燃性保护外壳。
Do not install the varistor near combustible substances (polyvinyl chloride wires, resin moldings, etc.). If it's difficult to do, install a nonflammable cover.

3) 线间使用
Across-the-line use

在线间使用时，将保险丝与压敏电阻器串联。
When the varistor is used across a line, put a current fuse in series with the varistor.

4) 线-地间使用
Use between line to ground

a) 在线-地间使用时，压敏电阻器短路时会产生接地电阻，电流保险丝不会熔断，可能引起压敏电阻器外涂层树脂冒烟或起火。
If the case that the varistor is used between a line to the ground, the short circuit of the varistor may not blow the current fuse because of grounding resistance, which may cause smoking and ignition of the varistors exterior resin.
为避免上述情况，请在电源端安装漏电断路器。如无漏电断路器，则需将电流保险丝与温度保险丝串联使用。
As the measure against it, install an earth leakage breaker on the power supply side of the varistor position. If no earth leakage breaker is installed, use a thermal fuse together with a current fuse in series.

b) 在带电部件与金属部件之间使用压敏电阻器时，压敏电阻器短路时有触电危险，故请将金属部件接地或勿与人体接触。
If the case that the varistor is used between a live parts to metal case, an electric shock may develop at a shortcircuit of the varistor; hence, ground the metal case to the ground or keep it from the human body.

7.2. 使用注意事项
Application notes

7.2.1. 注意下列事项，可能导致压敏电阻器寿命缩短或引发故障
Pay attention to the following items to avoid the shortened life and failure of the varistor.

1) 电路条件
Circuit conditions

a) 选定的压敏电阻器的电压最大值在最大连续工作电压值之上。
Select a varistor of which the maximum voltage including fluctuations in source voltage allows for the maximum permissible circuit voltage.

b) 短间隔性地施加浪涌时（施加抗干扰模拟试验电压时），不可超过压敏电阻器的额定功率。
In cases that surges are intermittently applied at short intervals (for example, in case that the voltage of the noise simulator test is implemented etc.),

c) 选定压敏电阻器时，须按照表1的标准产品型号
Select a varistor recommended in table 1.

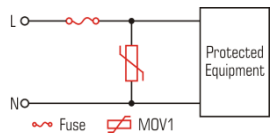
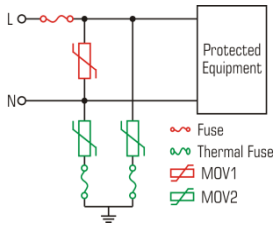
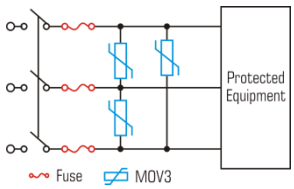
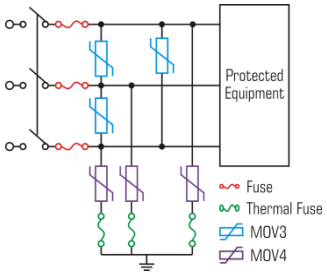
① 线间使用
Across-the-line use

单相三线式连线时单独配线负荷导致负荷不平衡、电压线和中性线短路、中性线欠损、容量性负荷情况下开闭时的共振等，将导致电源电压的上升，可能使用表1中标有 * 的产品型号。
If possible, use a part no. Marked with ✻ in case of voltage temporarily rises load unbalance of separately-wired loads, short between hot and neutral-line, open of neutral line in single-phase-three-wired system, and due to resonance at switching for a capacitive, inductive load.

② 线-地间使用
Used between line to ground

出现故障时，对地电压将上升，因此，请使用附表1中推荐的产品型号。
Use a different part no. From "across-the-line use" as table 1, because of raising voltage in case of "line to ground fault".

表1 – 压敏电阻器的适用范例
Table 1 - example of varistor application

<table>
<tr><td colspan="2">类别
Type</td><td>线间使用
Across-the-line use</td><td>线-地使用
Use between line to ground</td></tr>
<tr><td rowspan="2">连线举例
Connections example</td><td>DC / AC单相
DC/AC single-phase</td><td> 
</td><td> 
</td></tr>
<tr><td>AC三相
AC 3-phase</td><td> 
</td><td> 
</td></tr>
<tr><td colspan="2">压敏电阻选型举例
Example of varistor</td><td>
<table>
<tr><th>MOV</th><th>电源电压
Source voltage</th><th>压敏电阻
Varistor</th></tr>
<tr><td rowspan="6">MOV1
MOV3</td><td>AC100V</td><td>201 ~ 361✻</td></tr>
<tr><td>AC120V</td><td>241 ~ 431✻</td></tr>
<tr><td>AC200V</td><td>431 ~ 561✻</td></tr>
<tr><td>AC220V</td><td>471 ~ 621✻</td></tr>
<tr><td>AC240V</td><td>511 ~ 621✻</td></tr>
<tr><td>AC380V</td><td>821</td></tr>
</table>
</td><td>
<table>
<tr><th>MOV</th><th>电源电压
Source voltage</th><th>压敏电阻
Varistor</th></tr>
<tr><td rowspan="3">MOV2
MOV4</td><td>AC100V
AC220V</td><td>471, 511, 621✻,
821✻✻, 182✻✻✻</td></tr>
<tr><td>AC230V
AC240V</td><td>511, 621✻,
821✻✻, 182✻✻✻</td></tr>
<tr><td>AC380V</td><td>112✻✻
182✻✻✻</td></tr>
</table>
</td></tr>
</table>

进行设备的绝缘电阻试验（DC500V）时，请使用表1中推荐的标有✻✻的产品型号。使用不可清除绝缘性能试验的压敏电阻电压时，在一定的电路条件下，试验时可将压敏电阻器从电路上取下。
Use a varistor marked with ✻✻ in table 1, in case of the insulation resistance test (500Vdc) for equipment. When using a part of the varistor voltage that the insulation efficiency examination can not be cleared, there is a case where the varistor can be done by removing it from the circuit depending on the circuit condition.

进行设备的耐电压试验（AC1000V或AC1200V）时，请使用表1中推荐的标有✻✻✻的产品型号。
Use a varistor marked with ✻✻✻ in table 1, in case of the withstanding voltage test (1000Vac or 1200Vac) for equipment.

d) 关于电流保险丝
Concerning current fuse

① 所用压敏电阻器与电流保险丝的额定电流，一般推荐按下表进行选定。此外，在用户端，当压敏电阻器损坏时，确认其设备是否会发生2次伤害。
We recommend selecting a varistor and the rated current of a current fuse as follows. Finally, please be sure that there is no danger if the varistor mounted on the equipment breaks.

规格specs	05D	07D	10D	14D	20D
保险丝额定电压 Fuse rated current	⩽2A	⩽5A	⩽5A	⩽10A	⩽10A

② 保险丝的插入部位建议按表1操作。
The recommended fuse position is shown in table 1.

e) 温度保险丝
Concerning thermal fuse

将压敏电阻器与温度保险丝连接时，用户端请尽量选用热结合较好的保险丝。
Set a thermal fuse to get high thermal conductivity with varistor.

7.2.2. 使用环境
Operating environments

1) 压敏电阻器不可在室外使用。
The varistor is designed to be used indoors. Do not use it exposed outdoors.

2) 不可在阳光直射场所、发热源附近或温度超过使用温度范围的场所使用。
Do not use the varistor in places exposed to temperatures beyond the operating temperature range, such as places exposed to sunlight and vicinities of heating equipment.

3) 不可在淋雨、蒸汽、高湿度的场所使用。
Do not use the varistor in places exposed to high temperatures and high humidity, such as places exposed directly to rain, wind, dew condensation, and vapor.

4) 不可在粉尘或盐分较多的场所以及被腐蚀性气体污染的环境中使用。
Do not use the varistor in dusty and salty places and atmospheres polluted by corrosive gases.

7.2.3. 加工条件
Processing conditions

1) 不可采用可能导致外涂层树脂劣化的溶剂（稀释剂、丙酮等）进行清洗。
Do not wash the varistor by such solvents (thinner, acetone, etc) as its exterior resin deteriorates.

2) 不可施加可能导致外涂层树脂或元件出现破损的冲击或撞击、压力。
Do not apply a strong vibration or shock (by falling, etc) to the varistor, cracking to its exterior resin and element may occur.

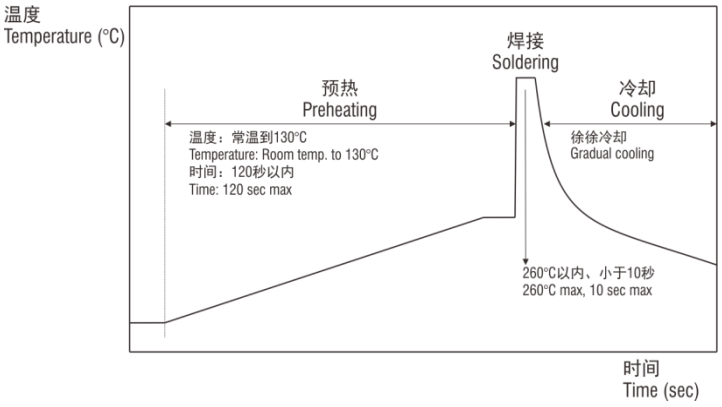
3) 将压敏电阻器进行树脂镀膜（含护膜塑模）时，不可使用可能导致压敏电阻器劣化的树脂。
When coating the varistor with resin (including molding), do not use such resin.

4) 压敏电阻器外涂层树脂附近的引线部位不可进行强烈折弯或施加外力。
Do not bend the varistor lead wires at the position close to its varistor exterior resin, or apply external force to the position.

5) 焊接时，请在如下条件下进行。且不可将构成压敏电阻器的焊接部位或绝缘材料熔化。
When soldering the varistor lead wires, follow the recommended conditions and do not melt the solder and insulating materials constituting the varistor.

焊接方式 Soldering method	推荐条件 Recommended condition	注意事项 Attention item
波峰焊 Flow soldering	260°C, 10秒以内 260°C, within 10 sec	引线型不是回流焊对象产品 Lead wires type is not reflow soldering object part.
上述以外的条件下使用时，请用户端自行确认。 For use other than the above conditions, please the client to confirm. 仅限进行1次返工，烙铁温度350°c以下，时间控制在5秒以内。 Only 1 times rework, soldering iron temperature should not exceed 350°c and should not be applied for more than 5		

■ 推荐焊接条件
Soldering temperature-time profile to recommend



7.2.4. 长期保管
Long-term storage

1) 压敏电阻器不可保存在高温、高湿场所。保存场所室温40 °C以下，湿度75%RH以下，保存期限为1年。
Do not store the varistor under high temperature and high humidity. Store it at a temperature up to 40 °C and at humidity below 75% RH, and use it within 1 year.
长期间保管（1年以上）时，使用时请确认产品的可焊性。
Before using the varistor that has been stored for a long period (1 years or longer), confirm the solderability.

2) 不可保存在腐蚀性气体（硫化氢、亚硫酸、氯气、氨气等）环境中。
Avoid atmospheres full of corrosive gases (hydrogen sulfide, sulfurous acid, chlorine, ammonia, etc).

3) 保存场所避免阳光直射、结露等。
Avoid direct sunlight and dew condensation.

7.3. 说明
Notices

用于可靠性要求极高的设备（航空航天设备、医疗设备等）时，请事先至本公司咨询使用型号和保护措施等相关事宜。
In cases that the varistor is used in equipment (aerospace equipment, medical equipment, etc) requiring extremely high reliability, ask us for a selection of part no., and protection coordination, etc in advance.

若未按照产品规格书记载事项进行操作，并由此导致出现异常时，本公司不负任何责任。
Note that we do not take any responsibility for faults and abnormalities resulting from the use not in conformity with the contents of entries in the delivery specification.

出现使用电路电压的异常上升、超高浪涌的侵入等不可预期因素时，可能导致压敏电阻器起火。为防止延烧到使用设备上，外部结构材料需使用阻燃材料进行多重保护。
There is a possibility that the varistor will unexpectedly cause smoke or ignite because of an abnormal rise of the circuit voltage and invasion of excessive surge. To prevent that accident from spreading over the equipment and not to expand the damage, use multiplex protection such as the adoption of frame-retardant materials for housing parts and structural parts.

8. 编带标准
TAPING SPECIFICATIONS

■ 方式一 Method 1

如下图所示

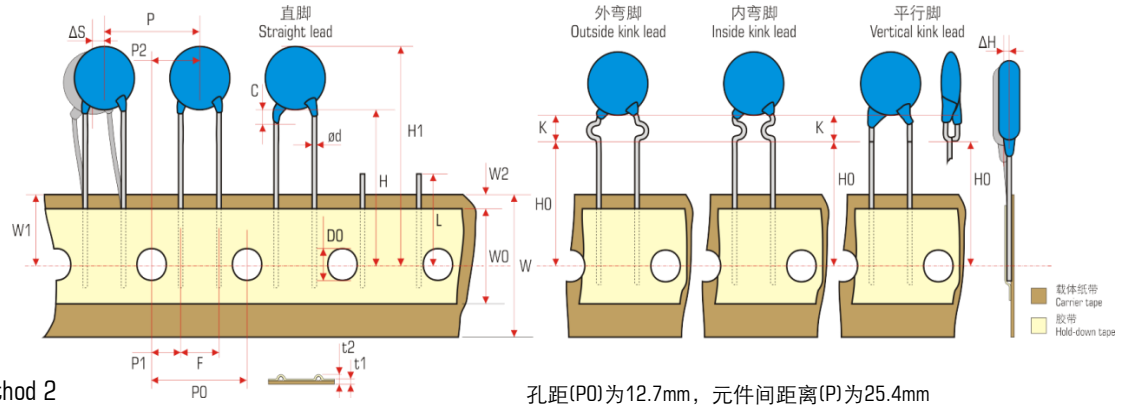
As shown in the following figure:

孔距(P0)与元件间距离(P)均为12.7mm

或者，孔距(P0)与元件间距离(P)均为15.0mm

12.7mm by feed hole pitch (P0) and components pitch (P)

or, 15.0mm by feed hole pitch (P0) and components pitch (P)



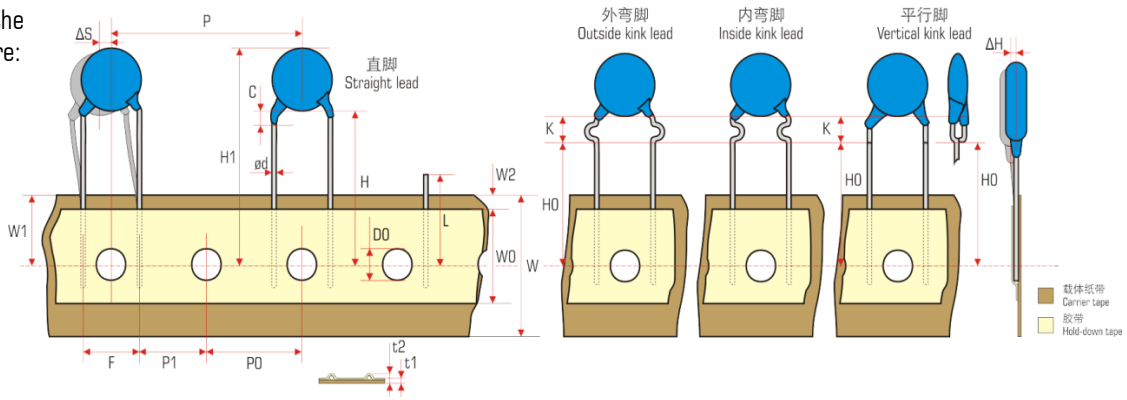
■ 方式二 Method 2

如下图所示

As shown in the following figure:

孔距(P0)为12.7mm，元件间距离(P)为25.4mm

Feed hole pitch (P0) with 12.7mm and components pitch (P) with 25.4mm



项目 Item	代码 Symbol	标准 Specifications	误差 Tolerance
弯脚架高 Height of kink	K	5.0	max
涂装脚长度 Coating rundown on leads	C	3.0	max
剪切长度 Snipped length	L	11.0	max
编带总厚度（含导线） Total tape, tape and lead wire	t2	1.9**	max
进料孔直径 Feed hole diameter	D0	4.0	±0.3
元件总高度 Component height	H1	40.0	max
元件到纸带中心的高度 Height of component from tape center	H0	16.0	±0.5
元件到纸带中心的高度 Height of component from tape center	H	18.0	+2.0 -0
胶带位置 Hold-down tape position	W2	3.0	max
孔位 Hole position	W1	9.0	+0.75 -0.5
胶带宽 Hold-down tape width	W0	7.0	min
纸带宽 Tape width	W	18.0	+1.0 -0.5
导线直径 Lead wire diameter	Φd	0.58*	±0.1

*: 根据产品直径的大小会有所变化，05D/07D为0.58mm，10D/14D为0.78mm，20D为1.0mm。
It varies according to the product diameter, such as 0.58mm for 05D & 07D, 0.78 for 10D & 14D, 1.0mm for 20D.

**:会依据导线直径而变化，如当导线直径为0.58mm时1.5mm最大，当导线直径为0.78mm时1.7mm最大。
Will vary according to the lead diameter, such as 1.5mm maximum when the lead diameter is 0.58mm; 1.7mm maximum when the lead diameter is 0.78mm

项目 Item	代码 Symbol	标准 Specifications			误差 Tolerance
		方式一 Method 1		方式二 Method 2	
进料孔与元件间距离 Hole center to component center	P2	6.35	7.5	---	±1.3
进料孔与导线间距离 Feed center to lead	P1	3.85	3.75	3.85	7.7	±0.7
孔距 Feed hole pitch	P0	12.7	15.0	12.7	12.7	±0.3
元件间距离 Component pitch	P	12.7	15.0	25.4	25.4	±1.0
脚距 Lead to Lead distance	F	5.0	7.5	7.5	10.0	±0.8