Dersonic®
德信立業 創新開拓

DOC NO.: DEC-SA-WI007
REV.: B/2
DATE: 2023/04/04

壓敏電阻器規格承認書
APPROVAL SPECIFICATION FOR VARISTORS

客戶 CUSTOMER	立創
客戶料號 CUSTOMER P/N	
客戶規格描述 CUST. DESCRIPTION	
規格描述 DESCRIPTION	07D821K/F5.08/直脚/L24/环氧(蓝)/ZNR
產品編碼 PART NUMBER	RM07D821KC1IE100
日期 DATE	2024/4/22
文件編號 DOC. NO.	DEC-SA-WI007

德爾創承認欄 APPROVED BY DERSONIC			客戶承認欄 APPROVED BY CUSTOMER	
批 準 APPROVED BY	審核 CHECK BY	制訂 FORMULATE BY	批 準 APPROVED BY	審核 CHECK BY
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ZNRC®

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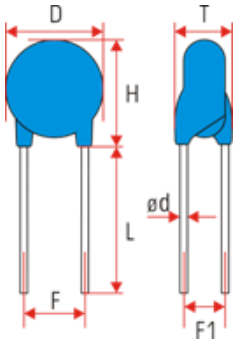
請確保我們的產品安裝到您的產品上前，已根據您的需求進行了評估。
Please make sure that your product has been evaluated in view of your specifications with our product being mounted to your product.
請您在使用我們的產品時，不要偏離此標準。
You are requested not to use our product deviating from this specification.

壓敏電阻器規格承認書
APPROVAL SPECIFICATION FOR VARISTORS

1. 規格表
DATA SHEET



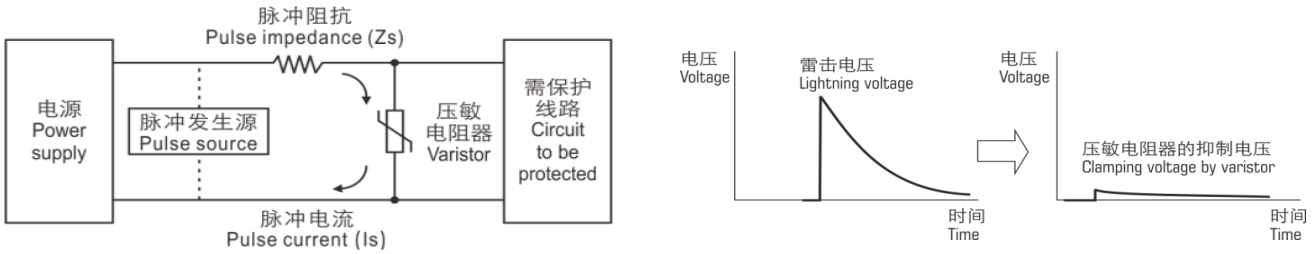
本體顏色: 藍色
Body color: Blue
包封層: 環氧樹脂（ UL94 V-0 ）
Coating: Epoxy resin (UL94 V-0)
導線: CP線
Lead wire: CP wire
印字: ZNR
Marking: 07D821K
□□D

產品編碼 Part number		RM07D821KC1IE100
客戶料號 Customer P/N		
最大連續工作電壓 Max continuous operating voltage		AC510V (max) DC670V (max)
壓敏電壓, VN Varistor voltage, VN		820V±10% @ 1mA,30ms
標稱脈衝電流, Ip Nominal pulse current, Ip		10A @ 8/20μs
最大抑制電壓, VC Maximum clamping voltage, VC		1355V (max) @ Ip
耐衝擊電流 Withstanding surge current	最大脈衝電流 Maximum pulse current	1250A (1 time) @ 8/20μs 600A (2 times) @ 8/20μs (5 minute interval)
	重複脈衝電流 Repetitive pulse current	450A (10 times), @ 8/20μs (90 sec. interval)
	衝擊壽命 Impulse life	75A (10 000 times) @ 8/20μs (10 sec. interval)
最大耐受能量 Maximum energy		52J @ 10/1000μs
額定功率 Rated power		0.25W
最大漏電流 Maximum leakage current		20μA @ 75% VN
最大電容量 Maximum capacitance		60pF @ 1kHz 1.0Vrms
工作溫度範圍 Operating temperature range		-40ºC～+105ºC
尺寸 Dimensions	D (Diameter)	8.5 mm±1.0mm
	T (Thickness)	5.2 mm±1.0mm
	H (Heitht)	13.0 mm max
	F (Lead spacing)	5.08 mm±0.8mm
	F1 (Lead malposed spacing)	3.70 mm±0.8mm
	L (Lead length)	24.0 mm±5.0mm
	ød (Lead diameter)	0.55 mm±0.10mm

2. 概述
INTRODUCTION

壓敏電阻是一種具有在一定的電壓條件下支援電流急速流出的電壓-電流特性的產品。
A varistor has the volt-ampere characteristics in which current suddenly starts to flow through the device at a certain voltage.

壓敏電阻的作用：保護在電子線路中的電子元器件免受過電壓的影響。如下圖所示，壓敏電阻並聯在電路中起保護作用。當有脈衝(脈衝電流Is：由脈衝電壓Vs和阻抗Zs決定)施加在電路上時，脈衝電流（Is）限制脈衝電壓在壓敏電阻的限制電壓Vc之內。
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.



壓敏電阻器對脈衝的吸收
PULSE ABSORPTION BY VARISTOR

相互的關係可以用下面的公式來解釋：
The relation can be expressed by the equations as follows:

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

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

因為Vs遠遠大於Vc，脈衝電流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，由於可承受電壓大於最大的限定電壓，電路可以長時間的免於脈衝電壓的損壞。
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.
由於吸收異常電壓和電流脈衝的特性，壓敏電阻可非常高效的保護電子器件。
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. 應用
APPLICATION

- ■ 消費電子產品：電視機、音訊輸出設備、安全插座、機上盒等
  Consumer electronics products: television, audio output device, safety plug, STB etc.
- ■ 工業產品：馬達、半導體元件、繼電器、電磁開關、電源線路、三相整流線路、自動控制線路等
  Industrial products: motor, semiconductor component, relay, electromagnetic switch, power circuit, three-phase rectifier circuit, automatic control circuit etc.
- ■ 通信設備：電話機、傳真機、交換機等
  Communication equipment: Telephone, facsimile, exchanger etc.
- ■ 電腦：電腦、顯示器、印表機、掃描器、電源、電源適配器等
  Computer: computer, displayer, printer, scanner, power supply, adapter etc.
- ■ 汽車電子產品
  Automotive electronics products

適用範圍
APPLICATIONS SCOPE

主要用途 Recommended Applications	規格 Specifications				
用於低壓電路，如用於保護半導體器件、汽車電子產品、DC48V以下的繼電器與電磁閥、靜電放電設備、行動電話等 For the low voltage circuit, Such as for the protection of semiconductor devices, automotive electronics, DC48V following relays and solenoid valves, electrostatic discharge equipment, mobile phones, etc.	05D180K 05D220K 05D270K 05D330K 05D390K 05D470K 05D560K 05D680K	07D180K 07D220K 07D270K 07D330K 07D390K 07D470K 07D560K 07D680K	10D180K 10D220K 10D270K 10D330K 10D390K 10D470K 10D560K 10D680K	14D180K 14D220K 14D270K 14D330K 14D390K 14D470K 14D560K 14D680K	20D180K 20D220K 20D270K 20D330K 20D390K 20D470K 20D560K 20D680K
用於電話，DC48V通信電路電線 Telephone, communication line (DC48V)	05D820K 05D101K 05D121K 05D151K	07D820K 07D101K 07D121K 07D151K	10D820K 10D101K 10D121K 10D151K	14D820K 14D101K 14D121K 14D151K	20D820K 20D101K 20D121K 20D151K
用於AC100V線與線間(如日本) AC100V line-line applications (Japan etc.)	05D181K 05D201K 05D221K	07D181K 07D201K 07D221K	10D181K 10D201K 10D221K	14D181K 14D201K 14D221K	20D181K 20D201K 20D221K
用於AC100～120V線與線間(如日本、美國等) AC100V～120V, line-line applications (Japan, US etc.)	05D241K 05D271K 05D301K	07D241K 07D271K 07D301K	10D241K 10D271K 10D301K	14D241K 14D271K 14D301K	20D241K 20D271K 20D301K
用於AC100～120V線與線間，用於電話(應對250V絕緣阻抗測試) AC100V～120V, line-line applications, telephone line applications (for DC250V insulation resistance test)	05D331K 05D361K 05D391K	07D331K 07D361K 07D391K	10D331K 10D361K 10D391K	14D331K 14D361K 14D391K	20D331K 20D361K 20D391K
用於AC200～220V線與線間、線與大地間 AC200V～220V, line-line and line-ground applications	05D431K 05D471K 05D511K	07D431K 07D471K 07D511K	10D431K 10D471K 10D511K	14D431K 14D471K 14D511K	20D431K 20D471K 20D511K
用於AC240V線與線間、線與大地間(如英國、澳洲等) AC240V, line-line and line-ground applications (UK, Australia etc.)	05D561K 05D621K 05D681K	07D561K 07D621K 07D681K	10D561K 10D621K 10D681K	14D561K 14D621K 14D681K	20D561K 20D621K 20D681K
用於AC380V線與線間、線與大地間 AC380V, line-line and line-ground applications	05D751K	07D751K 07D781K 07D821K	10D751K 10D781K 10D821K	14D751K 14D781K 14D821K	20D751K 20D781K 20D821K
用於AC415V線與線間、線與大地間 AC415V, line-line and line-ground applications			10D911K	14D911K	20D911K
用於AC480V線與線間、線與大地間 AC480V, line-line and line-ground applications			10D102K 10D112K	14D102K 14D112K 14D122K 14D142K	20D102K 20D112K 20D122K 20D142K
用於線與大地間(應對AC1200V耐壓測試) line-ground applications (for AC1200V withstanding test)				14D162K 14D182K	20D162K 20D182K

4. 基本特性
GENERAL CHARACTERISTIC

■ 特性表
Characteristic sheet

壓敏電壓 Varistor voltage	壓敏電壓範圍 Varistor voltage range (@ 1mA)	最大工作電壓 Max operating voltage		抑制電壓 Clamping voltage (VC) @ Ip 8/20 μ s
		AC	DC	
	V	V	V	V max
180K	15.8～20.7	11	14	36
220K	19.4～25.3	14	18	43
270K	23.7～31.1	17	22	53
330K	29.0～36.3	20	26	65
390K	35.1～42.9	25	31	77
470K	42.3～51.7	30	38	93
560K	50.4～61.6	35	45	110
680K	61.2～74.8	40	56	135
820K	73.8～90.2	50	65	135
101K	90～110	60	85	165
121K	108～132	75	115	200
151K	135～165	95	125	250
181K	162～198	115	150	300
201K	180～220	130	170	340
221K	198～242	140	180	360
241K	216～264	150	200	395
271K	243～297	175	225	455
301K	270～330	195	250	505
331K	297～363	210	275	545
361K	324～396	230	300	595
391K	351～429	250	320	650
431K	387～473	275	350	710
471K	423～517	300	385	775
511K	459～561	320	415	845
531K	477～583	330	435	875
561K	504～616	350	460	915
621K	558～682	385	505	1025
681K	612～748	420	560	1120
721K	648～792	440	585	1180
751K	675～825	460	615	1240
781K	702～858	485	640	1290
821K	738～902	510	670	1355
911K	819～1001	550	745	1500
951K	855～1045	575	765	1570
102K	900～1100	625	825	1650
112K	990～1210	680	895	1815
122K	1080～1320	750	1060	2000
142K	1260～1540	880	1140	2310
162K	1440～1760	940	1280	2640
182K	1620～1980	1000	1465	2970

尺寸規格 Nominal diameter	等級電流 Class current (Ip) @ 8/20 μ s	耐衝擊電流 Withstanding impulse current 8/20 μ s			額定功率 Rated power
	A	1 time	2 times	10^4 times	W
Varistor voltage: 180K ～ 680K (D, T type)					
05D	1	125	50	4	0.01
07D	2.5	250	125	10	0.02
10D	5	500	250	20	0.05
14D	10	1000	500	40	0.1
20D	20	2000	1000	80	0.2
Varistor voltage: 180K ～ 680K (V type)					
05D	1	250	100	10	0.01
07D	2.5	500	250	20	0.02
10D	5	1000	500	40	0.05
14D	10	2000	1000	80	0.1
20D	20	3000	2000	120	0.2
Varistor voltage: 820K ～ 182K (D, T, K type)					
05D	5	600	200	17	0.1
07D	10	1250	600	75	0.25
10D	25	2500	1250	120	0.4
14D	50	4500	2500	150	0.6
20D	100	6500	4500	190	1
Varistor voltage: 820K ～ 182K (V type)					
05D	5	800	400	22	0.1
07D	10	1750	1200	100	0.25
10D	25	3500	2500	150	0.4
14D	50	6000	4500	200	0.6
20D	100	10000	6500	250	1
Varistor voltage: 391K ～ 112K (J type)					
07D	10	1800	1250	120	0.25
10D	25	4000	3000	175	0.4
14D	50	8000	6000	220	0.6
20D	100	15000	10000	400	1
Varistor voltage: 391K ～ 182K (Q type)					
10D	25	4000	3000	175	0.4
14D	50	8000	6000	220	0.6
20D	100	13000	8000	300	1

Note:

K type: General type

D type: Standard type

T type: Hi-temperature (125°C) type, based on D type

V type: Hi-energy type

J type: Withstanding surge type

Q type: Appendix Q (IEC 60950-1, 6KV/3KA)

4. 基本特性
GENERAL CHARACTERISTIC

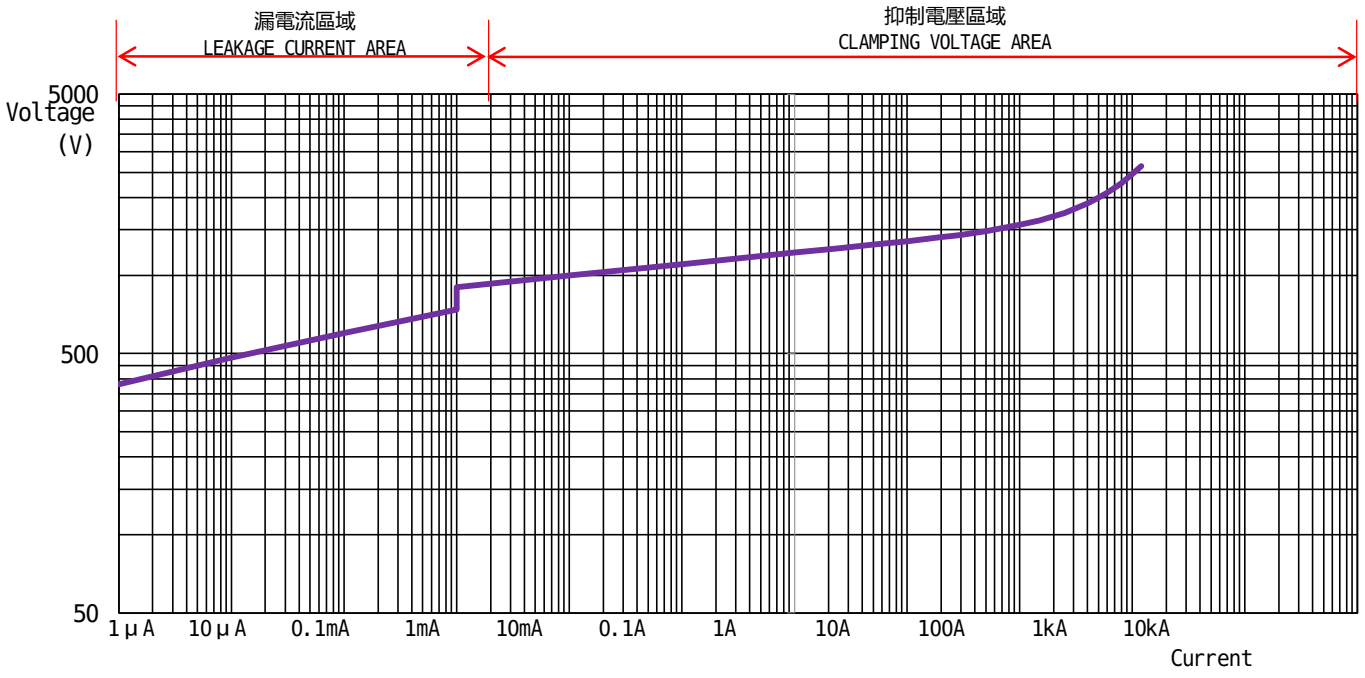
■ 符合RoHS 2.0、REACH及無鹵
Comply with rohs 2.0, reach, halogen-free available.

■ 安規認證
Safety certification

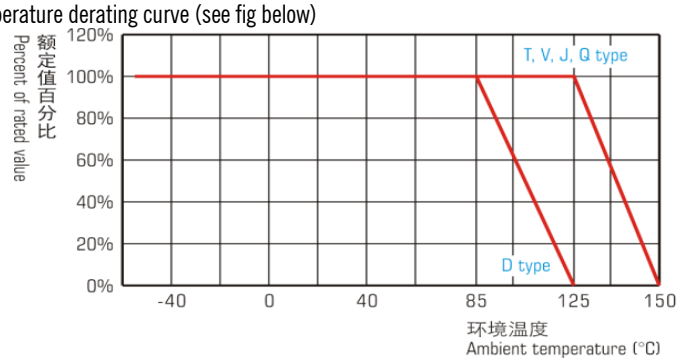
認證機構 CERTIFICATE AUTHORITY	認證標準 APPROVAL STANDARD	證書編號 CERTIFICATE NO.	認證範圍 CERTIFICATION RANGE		
			規格 SPECS	壓敏電壓 VARISTOR VOLTAGE	最大連續交流電壓 MAXIMUM CONTINUOUS OPERATING VOLTAGE A.C.
CQC	GB/T 10193-1997 GB/T 10194-1997	CQC14001104814	07D	18V-820V	11VAC-510VAC
	GB 4943.1-2022 IEC 61051-2:1991+Amd1:2009 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	IEC 61051-1:2018 IEC 61051-2:1991/A1:2009 IEC 61051-2-2:1991	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 is only applicable to 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07D821K抑制電壓特性曲線(供參考)
Typical 07D821K clamping voltage characteristic curve (for reference)



■ 工作溫度降額曲線(見下圖)
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

請注意：額定特性包括最大連續工作電壓、耐衝擊電流、能量耐量及額定功率，降幅2.5%/ºC
Please note: rated characteristic includes maximum continuous operating voltage, withstanding surge current, maximum energy and rated dissipation power, 2.5%/ºC reduction.

■ 壓敏電壓溫度係數
Temperature coefficient of varistor voltage: 0 to -0.05 %/ºC max.

■ 儲存溫度範圍
Storage temperature range: -55ºC～+150ºC

■ 絕緣電壓
Insulation voltage: 2500V 60s (body Insulation)

5. 名詞解釋
DEFINITIONS

1) 最大連續工作電壓：在環境溫度25ºC下，允許連續施加在壓敏電阻器上的最大工頻正弦電壓有效值Uac(總諧波失真小於5%)或直流電壓值Udc。
Maximum continuous operating voltage: maximum ac RMS voltage Uac or maximum dc voltage Udc which can be applied continuously at a temperature of 25ºC. Uac shall be a substantially sinusoidal voltage (less than 5% total harmonic distortion).

2) 壓敏電壓：直流參考電流流過壓敏電阻器時，壓敏電阻器兩端的直流電壓值。
Varistor voltage: dc voltage across the varistor when the dc reference current flows through the varistor.

3) 標稱脈衝電流：是一個電流峰值，它是以每分鐘2次的方式用8/20μs脈衝電流衝擊100次，壓敏電阻器可以通過的電大峰值電流的1/10。
Nominal pulse current: it is a current peak value. It is pulsed 100 times with 8/20 μs pulse current in 2 times per minute, and the varistor can pass 1/10 of the peak current.

4) 抑制電壓：是指在標準大氣條件下，壓敏電阻器中通過標稱脈衝電流時，其兩端呈現的電壓峰值。
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) 耐衝擊電流：壓敏電阻器允許通過的規定波形的每個脈衝的最大電流值。
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：能被壓敏電阻器吸收指定波形的最大單個脈衝能量，除非另有規定應使用10/1000μs脈衝。
Maximum energy: the maximum single pulse energy of the specified waveform that can be absorbed by the varistor. Unless otherwise specified, 10/1000 μs pulses should be used.

7) 額定功耗：在25℃的環境溫度下的最大允許功耗。
Rated power: the maximum allowable power dissipation of varistors at an ambient temperature of 25ºC.

8) 漏電流：在25℃或規定的其他溫度下，施加最大直流電壓時，通過壓敏電阻器中的電流。
Leakage current: the current through the varistor at the maximum dc voltage applied at 25ºC or other specified temperature.

6. 產品編碼
PART NUMBER

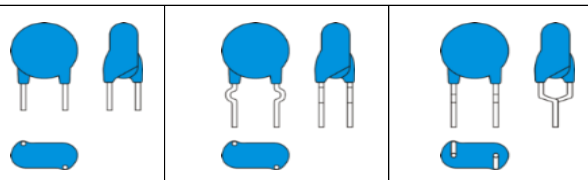
RM	07	D	821	K	C	1	I	E	100
系列 Series	標稱直徑 Nominal diameter	形狀 Shape	壓敏電壓 Varistor voltage	誤差 Tolerance	腳距 Lead spacing	腳型 Lead style	編帶包裝或散裝腳長 Taping packing or Lead length (bulk)	包封材質 Coating material	類別和標誌 Type and marking

序號 No.	名稱 Field name	表達內容 Expression
1	系列 Series	RM: 壓敏電阻器 ZnO (Zinc oxide) Varistors
2	標稱直徑 Nominal diameter	07: 7mm
3	形狀 Shape	D: 圓形 Disc
4	壓敏電壓 Varistor voltage	821: 820V
5	誤差 Tolerance	K: ±10%
6	腳距 Lead spacing	C: F=5.08mm
7	腳型 Lead style	1: 直脚 Straight Leads
8	編帶包裝或散裝腳長 Taping packing or Lead length (bulk)	I: 散件包装, 脚长(L)=24mm Bluk packing, Lead length (L)=24mm
9	包封材質 Coating material	E: 环氧(蓝) Epoxy (Blue)
10	類別和標誌 Type and marking	100: 标准型,打印ZNR商标 Standard type, printed ZNR trademark

常用標稱直徑有:
Common nominal diameters are: 5mm, 7mm, 10mm, 14mm, 20mm

常用壓敏電壓有:
Common varistor voltage are: 18V, 22V, 27V, 33V, 39V, 47V, 56V, 68V, 82V, 100V, 120V, 150V, 180V, 200V, 220V, 240V, 270V, 300V, 330V, 360V, 390V, 430V, 470V, 510V, 560V, 620V, 680V, 750V, 780V, 820V, 910V, 1000V, 1100V, 1200V, 1800V.

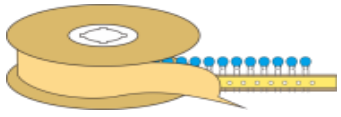
腳型示意圖
LEAD STYLE DIAGRAM



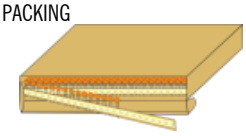
直腳 STRAIGHT LEAD	外彎腳 OUTSIDE KINK LEAD	平行腳 VERTICAL KINK LEAD

編帶包裝方式示意圖
TAPING PACKAGING DIAGRAM

卷圓盤包裝
REEL PACKING



折疊包裝
AMMO PACKING



7. 測量與試驗
MEASUREMENT AND TESTING

如無特殊需要，壓敏電阻器應在下列環境條件下進行試驗：
If there is no special need, varistor measurement and testing should be conducted under the following environmental conditions:

溫度 Temperature	相對濕度 Relative humidity	大氣壓力: Atmospheric pressure:
25ºC±5ºC	30%～70%	86kpa～106kpa

序號 No.	檢驗項目 Item		要求 Specification	試驗方法 Testing method
1	外觀與尺寸 Appearance And dimension		外觀形狀沒有明顯的缺點，尺寸在標準範圍內。 No marked defect on appearance form and dimensions are within specified range.	壓敏電阻器必須用目視檢查其明顯的缺點。 The varistors should be visually inspected for evidence of defect. 尺寸用遊標卡尺測量。 Dimensions should be measured with slide calipers.
2	標誌 Marking		清晰易於識別。 To be easily legible.	目視檢查。 The capacitor should be visually inspected.
3	抑制電壓 Clamping voltage		滿足額定值 To meet the specified value.	使用波形為8/20μs的標稱脈衝電流施加在壓敏電阻器引出端上，同時測試抑制電壓的峰值。 A nominal pulse current of 8/20μs waveform was applied to the varistor terminals and the clamping voltage peak was tested.
4	壓敏電壓 Varistor voltage		在誤差範圍內。 Within specified tolerance.	將壓敏電阻器固定在無銹蝕的夾具上，按"規格表"規定的條件進行測試壓敏電阻器引出端的電壓。 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	電容量 Capacitance		滿足額定值 To meet the specified value.	在標準大氣條件下，使用1kHz、1V的條件進行測量。 Measurement at 1kHz, 1V under standard atmospheric conditions
6	漏電流 Leakage current		滿足額定值 To meet the specified value.	在25ºC時施加75%的最大連續直流電壓，測量其漏電流。 Apply a maximum continuous dc voltage of 75% to the varistor at 25ºC and measure its leakage current.
7	電流衝擊 穩定性 Impulse testing stability	重複脈衝電流 Repetitive pulse current	試驗過程中壓敏電阻器應無擊穿、閃絡，外觀不應有任何機械損傷 The varistor should have no breakdown or flashover during the test, and the appearance should not have any mechanical damage 衝擊後，應在常溫下恢復2h，測量壓敏電壓，其值相對於初始值的變化率應小於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，對壓敏電阻器施加10次重複脈衝電流，每個方嚮衝擊各5次，相鄰兩次衝擊的間隔為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.
		方波電流 Square wave current		對壓敏電阻器施加1次方波電流衝擊(2ms或者10/1000μs)的衝擊，方嚮任意。 The varistor is subjected to a square wave current impulse (2ms or 10/1000μs), in any direction.
8	最大脈衝電流 Max pulse current			在8/20μs波形下，對壓敏電阻器施加1次最大脈衝電流衝擊，方嚮任意。 Under 8/20μs waveform, the varistor is subjected to a max pulse current impulse, in any direction.
9	耐電壓 Withstand voltage		試驗過程中壓敏電阻器無擊穿、電弧、閃絡等現象，外觀不應有任何機械損傷 The varistor should have no breakdown, arcing or flashover during the test, and the appearance should not have any mechanical damage.	首先，將壓敏電阻器的端子擰在一起，然後將金屬箔包住壓敏電阻器離端子3-4mm的本體，接著將壓敏電阻器插入盛著直徑為1mm的金屬球的容器中，最後施加2500V的電壓60秒種。 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.

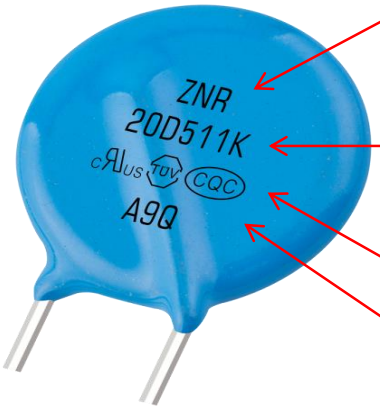
續上表
Continued on the table

序號 No.	檢驗項目 Item	要求 Specification	試驗方法 Testing method
10	最大能量 Maximum energy	滿足額定值 To meet the specified value.	在10/1000μs電流波下，壓敏電阻器能承受的最大能量。 The maximum energy that the varistor can absorb under the 10/1000 μs current wave.
11	衝擊壽命 Impulse life	試驗後壓敏電阻器外觀不應有任何機械損傷，壓敏電壓變化率不應超過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%	常室溫下，將指定的脈衝電流間隔10秒接通10000次，在1小時至2小時時間段內測定其特性。 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.
12	額定功率 Rated power	滿足額定值 To meet the specified value.	在環境溫度25ºC下施加連續脈衝電流時，壓敏電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 25ºC.
13	壓敏電壓溫度係數 Temperature coefficient of varistor voltage	滿足額定值 To meet the specified value.	$\frac{V_{n2}-V_{n1}}{V_{n1}} \times 1/60 \times 100(\%/℃)$ 式中，VN1是25ºC下的壓敏電壓值，VN2是85ºC下的壓敏電壓值 Where VN1 is varistor voltage at 25ºC and VN2 is varistor voltage at 85ºC
14	導線抗張強度 Terminal tensile strength	導線無折斷，壓敏電阻器無破損。 Lead wire should not be cut off. Varistor should not be broken.	固定壓敏電阻器的本體，使壓敏電阻器每支導線均承受10N(1.0mm導線直徑為20N)垂直力，保持10±1秒鐘。 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	導線抗折強度 Terminal bending strength	導線無折斷，壓敏電阻器無破損。 Lead wire should not be cut off. Varistor should not be broken.	壓敏電阻器導線應承受5N(1.0mm導線直徑為10N)重量，然後嚮外彎折成90º，然後回復到原來位置；接著往反方嚮彎折90º，再復原；彎折一次2-3秒鐘。 Each lead wire should be subjected to 5N (1.0mm lead wire diameter is 10N) weight and then a 90º bend, at the point of egress, in one direction, return to original position, and then apply a 90º bend in the opposite direction at the rate of one bend in 2 to 3 s.
16	可焊性 Solderability of leads	導線必須有3/4以上的面積均勻附著焊錫。 Lead wire should be soldered with uniform coating on the axial direction over 3/4 of the circumferential direction.	將壓敏電阻器的導線浸入焊料中2±0.5秒鐘，浸入深度離導線根部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. 焊錫溫度：245±5ºC Temp. of solder: 245±5ºC
17	耐焊接熱 Soldering effect	試驗後壓敏電阻器外觀不應有任何機械損傷，壓敏電壓變化率不應超過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%.	導線浸入離導線根部1.5-2.0mm處、錫溫為260±5ºC錫槽中10±1秒。試驗後，壓敏電阻器應在室溫中恢復2小時。 The lead wires should be immersed in solder of 260±5ºC 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	振動 Vibration resistance	試驗後壓敏電阻器外觀不應有任何機械損傷，壓敏電壓變化率不應超過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%.	將壓敏電阻器導線焊穩和調整振動頻率範圍為10-55Hz、總振幅為1.5mm，振動從10Hz到55Hz，然後再回到10Hz，大約一分鐘。總時間六個小時，每兩小時在相互垂直方嚮來回三次。 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.

續上表
Continued on the table

序號 No.	檢驗項目 Item	要求 Specification	試驗方法 Testing method
19	耐濕負荷 Humidity loading	試驗後壓敏電阻器外觀不應有任何機械損傷，壓敏電壓變化率不應超過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%.	壓敏電阻器保持在溫度為40±2ºC、相對濕度為90%-95%條件下施加最大連續交流電壓500±12小時。 Apply the max continuous operating ac voltage for 500±12 h. At 40±2ºC in 90% to 95% relative humidity. 試驗結束後，壓敏電阻器應在室溫下恢復2小時。 After the test, the varistor should recover at room temperature for 2h.
20	高溫負荷 High temperature loading	試驗後壓敏電阻器外觀不應有任何機械損傷，壓敏電壓變化率不應超過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%.	應給壓敏電阻器施加最大連續交流電壓，儲存最高工作溫度下1000±12小時。 The maximum continuous ac voltage should be applied to the varistor and stored at a maximum operating temperature of 1000 ±12 h 試驗結束後，壓敏電阻器應在室溫下恢復2小時。 After the test, the varistor should recover at room temperature for 2 h.
21	溫度迴圈 Temperature cycle	試驗後壓敏電阻器外觀不應有任何機械損傷，壓敏電壓變化率不應超過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%	溫度迴圈試驗按以下條件進行試驗和測量 Temperature cycling shall be measured in the following test. Step Temperature Time 1 -40±2ºC 30min 2 +125±2ºC 30min 迴圈次數：5次 Cycle numbers: 5 cycles 試驗結束後，壓敏電阻器應在室溫下恢復2小時。 After the test, the varistor should recover at room temperature for 2 h.
22	阻燃性 Passive flammability	火焰撤去後30秒內，燃燒應能自熄 The burning of the sample shall be self-extinguishing within 30 s after removing the needle flame.	按[IEC 60695-11-5]對MOV進行針狀火焰試驗。火焰施加部位為電阻體樣品的側面，施加時間為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.

8. 標誌說明
MARKING DESCRIPTION



公司商標
Company trademark
德爾創商標：
Dersonic's trademark: ZNR ZNRC

壓敏電阻規格
Varistor specifications, ex.: 20, Nominal chip diameter 20mm
D, disc chip,
511, varistor voltage 510V (51×101)
K, varistor voltage tolerance ±10%

安規標誌
Safety certification marking

生產週期和內部識別碼
Production cycle and internal identification code, ex.:

A 9 Q

生產年份 Production year
A, 2020
B, 2021
⋮
Z, 2045
A, 2046

生產月份 Production month
1, Jan. ; 2, Feb.;
⋮
9, Sept.; O, Oct.;
N, Nov.; D, Dec.

識別碼 Production ID
D, Standard type; K, General type
T, Hi-temperature (125ºC) type;
V, Hi-energy type;
J, Withstanding surge type (07D, 2.5kV/40 times; 10D, 4kV/40 times);
Q, Appendix Q (IEC 60950-1, 6KV/3KA) type

9. 安全注意事項
SAFETY PRECAUTIONS

使用壓敏電阻器時，壓敏電阻器周圍條件（設備設計中的材料、環境、電源條件、電路條件等）發生異常時，則可能引發火災、觸電、燒傷、以及產品故障。
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.
下列內容為使用時的相關注意事項，請認真確認後再行使用。如對未及事項有疑議，請速與我公司擔當部門聯繫。
The precautions for this product are described below; understand the content thoroughly before usage. For more questions, contact us.

9.1. 嚴格遵守事項
Precautions to be strictly observed

9.1.1. 額定性能確認
Confirmation of performance ratings

請遵守壓敏電阻器的最大連續工作電壓，耐衝擊電流、最大能量耐量、浪湧壽命、額定功率和操作溫度範圍等額定性能的規定，在規定範圍內使用。
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.
超出規定範圍使用，則會造成壓敏電阻器性能劣化，破壞元件，嚴重可引起壓敏電阻器冒煙或起火。
If used outside the range, the varistor can be degrade and have element fracture, which may result in smoking and ignition.

9.1.2. 為避免意外現象發生，請採用如下對策
To avoid accidents due to unexpected phenomena, take the following measures

1) 壓敏電阻器受損時，可能出現破碎飛散，因此要對整合式產品加保護蓋或外盒。
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) 請勿安裝在可燃物品（塑膠電線、樹脂合成物等）附近。若無法避免，請使用不燃性保護外殼。
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) 線間使用
Across-the-line use

線上間使用時，將保險絲與壓敏電阻器串聯。
When the varistor is used across a line, put a current fuse in series with the varistor.

4) 線-地間使用
Use between line to ground

a) 線上-地間使用時，壓敏電阻器短路時會產生接地電阻，電流保險絲不會熔斷，可能引起壓敏電阻器外塗層樹脂冒煙或起火。
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.
為避免上述情況，請在電源端安裝漏電斷路器。如無漏電斷路器，則需將電流保險絲與溫度保險絲串聯使用。
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) 在帶電部件與金屬部件之間使用壓敏電阻器時，壓敏電阻器短路時有觸電危險，故請將金屬部件接地或勿與人體接觸。
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.

9.2. 使用注意事項
Application notes

9.2.1. 注意下列事項，可能導致壓敏電阻器壽命縮短或引發故障
Pay attention to the following items to avoid the shortened life and failure of the varistor.

1) 電路條件
Circuit conditions

a) 選定的壓敏電阻器的電壓最大值在最大連續工作電壓值之上。
Select a varistor of which the maximum voltage including fluctuations in source voltage allows for the maximum permissible circuit voltage.

b) 短間隔性地施加浪湧時（施加抗幹擾類比試驗電壓時），不可超過壓敏電阻器的額定功率。
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.), do not let them exceed the varistors rated power.

c) 選定壓敏電阻器時，須按照表1的標準產品型號
Select a varistor recommended in table 1.

① 線間使用
Across-the-line use

單相三線式連線時單獨配線負荷導致負荷不平衡、電壓線和中性線短路、中性線欠損、容量性負荷情況下開閉時的共振等，將導致電源電壓的上升，可能使用表1中標有＊的產品型號。
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 線-地間使用
Used between line to ground

出現故障時，對地電壓將上升，因此，請使用附表1中推薦的產品型號。
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 – 壓敏電阻器的適用範例
Table 1 - example of varistor application

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Type</th><th>線間使用
Across-the-line use</th><th>線-地使用
Use between line to ground</th></tr>
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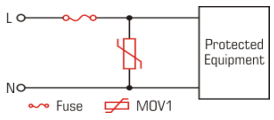
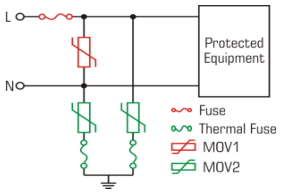
DC/AC single-phase</td><td> 
</td><td> 
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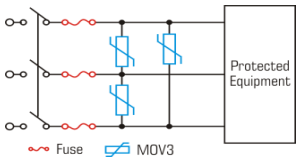
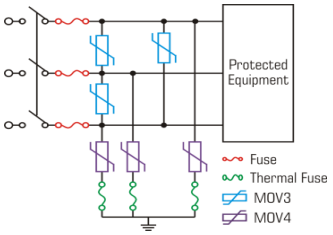
AC 3-phase</td><td> 
</td><td> 
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<tr><td colspan="2">壓敏電阻
選型舉例
Example of varistor</td><td>
<table>
<tr><th>MOV</th><th>電源電壓
Source voltage</th><th>壓敏電阻
Varistor</th></tr>
<tr><td rowspan="6">MOV1
MOV3</td><td>AC100V</td><td>201 ～ 361✻</td></tr>
<tr><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>電源電壓
Source voltage</th><th>壓敏電阻
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>

進行設備的絕緣電阻試驗（DC500V）時，請使用表1中推薦的標有✻✻的產品型號。使用不可清除絕緣性能試驗的壓敏電阻電壓時，在一定的電路條件下，試驗時可將壓敏電阻器從電路上取下。
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.

進行設備的耐電壓試驗（AC1000V或AC1200V）時，請使用表1中推薦的標有✻✻✻的產品型號。
Use a varistor marked with ✻✻✻ in table 1, in case of the withstanding voltage test (1000Vac or 1200Vac) for equipment.

d) 關於電流保險絲
Concerning current fuse

① 所用壓敏電阻器與電流保險絲的額定電流，一般推薦按下表進行選定。此外，在用戶端，當壓敏電阻器損壞時，確認其設備是否會發生2次傷害。
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.

規格specs	05D	07D	10D	14D	20D
保險絲額定電壓 Fuse rated current	≤2A	≤5A	≤5A	≤10A	≤10A

② 保險絲的插入部位建議按表1操作。
The recommended fuse position is shown in table 1.

e) 溫度保險絲
Concerning thermal fuse

將壓敏電阻器與溫度保險絲連接時，使用者端請儘量選用熱結合較好的保險絲。
Set a thermal fuse to get high thermal conductivity with varistor.

9.2.2. 使用環境
Operating environments

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

2) 不可在陽光直射場所、發熱源附近或溫度超過使用溫度範圍的場所使用。
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、高濕度的場所使用。
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) 不可在粉塵或鹽分較多的場所以及被腐蝕性氣體汙染的環境中使用。
Do not use the varistor in dusty and salty places and atmospheres polluted by corrosive gases.

9.2.3. 加工條件
Processing conditions

1) 不可採用可能導致外塗層樹脂劣化的溶劑（稀釋劑、丙酮等）進行清洗。
Do not wash the varistor by such solvents (thinner, acetone, etc) as its exterior resin deteriorates.

2) 不可施加可能導致外塗層樹脂或元件出現破損的衝擊或撞擊、壓力。
Do not apply a strong vibration or shock (by falling, etc) to the varistor, cracking to its exterior resin and element may occur.

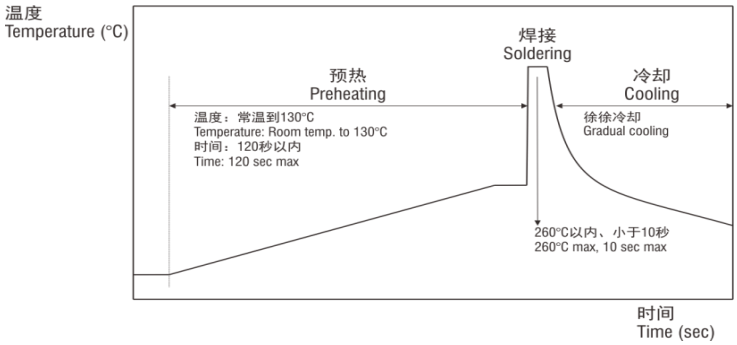
3) 將壓敏電阻器進行樹脂鍍膜（含護膜塑模）時，不可使用可能導致壓敏電阻器劣化的樹脂。
When coating the varistor with resin (including molding), do not use such resin.

4) 壓敏電阻器外塗層樹脂附近的引線部位不可進行強烈折彎或施加外力。
Do not bend the varistor lead wires at the position close to its varistor exterior resin, or apply external force to the position.

5) 焊接時，請在如下條件下進行。且不可將構成壓敏電阻器的焊接部位或絕緣材料熔化。
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	推薦條件 Recommended condition	注意事項 Attention item
波峰焊 Flow soldering	260ºC, 10秒以內 260ºC, within 10 sec	引線型不是回流焊物件產品 Lead wires type is not reflow soldering object part.
上述以外的條件下使用時，請用戶端自行確認。 For use other than the above conditions, please the client to confirm. 僅限進行1次返工，烙鐵溫度350ºc以下，時間控制在5秒以內。 Only 1 times rework, soldering iron temperature should not exceed 350ºc and should not be applied for more than 5 sec.		

■ 推薦焊接條件
Soldering temperature-time profile to recommend



9.2.4. 長期保管
Long-term storage

1) 壓敏電阻器不可保存在高溫、高濕場所。保存場所室溫40 ºC以下，濕度75%RH以下，保存期限為1年。
Do not store the varistor under high temperature and high humidity. Store it at a temperature up to 40 ºC and at humidity below 75% RH, and use it within 1 year.
長期間保管（1年以上）時，使用時請確認產品的可焊性。
Before using the varistor that has been stored for a long period (1 years or longer), confirm the solderability.

2) 不可保存在腐蝕性氣體（硫化氫、亞硫酸、氯氣、氨氣等）環境中。
Avoid atmospheres full of corrosive gases (hydrogen sulfide, sulfurous acid, chlorine, ammonia, etc).

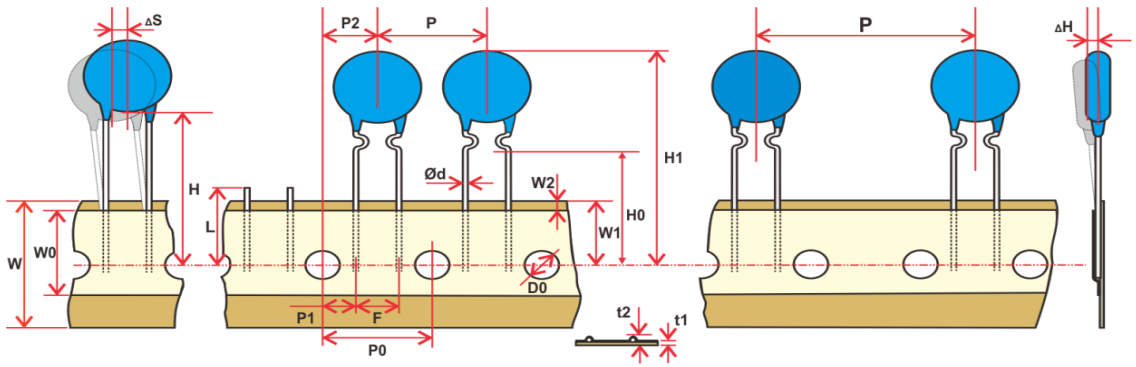
3) 保存場所避免陽光直射、結露等。
Avoid direct sunlight and dew condensation.

9.3. 說明
Notices

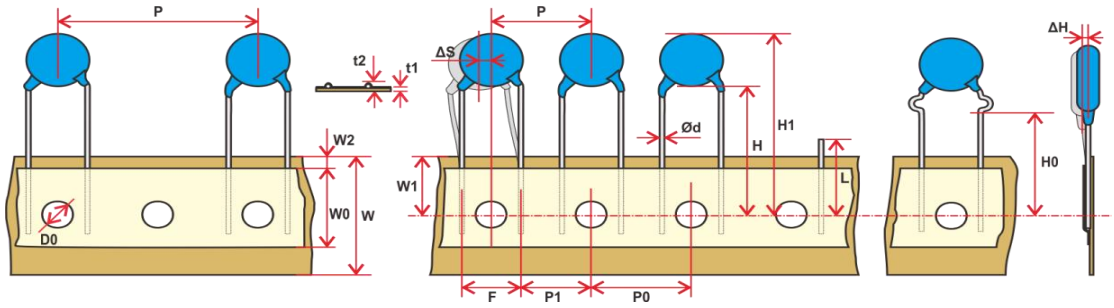
用於可靠性要求極高的設備（航空航太設備、醫療設備等）時，請事先至本公司諮詢使用型號和保護措施等相關事宜。
In cases that the varistor is used in equipment (aerospace equipment, medical equipment, etc) requiring extremely high reliability, ask us for a selection of part no., and protection coordination, etc in advance.
若未按照產品規格書記載事項進行操作，並由此導致出現異常時，本公司不負任何責任。
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.
出現使用電路電壓的異常上升、超高浪湧的侵入等不可預期因素時，可能導致壓敏電阻器起火。為防止延燒到使用設備上，外部結構材料需使用阻燃材料進行多重保護。
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.

10. 編帶標準
TAPING SPECIFICATIONS

■ Method 1 : sprocket hole between parts



■ Method 2: sprocket hole between leads



Item		Symbol	Specification (mm)	Remarks
Lead-wire diameter		Ød	0.55±0.1	
Pitch of component		P		
Feed hole pitch		P0		Cumulative pitch error: 1.0mm/20 pitch
Feed hole center to lead		P1		
Hole center to component center		P2		
Lead-to-lead distance		F	5.08±0.8	
Component alignment		Δh	≤2.0	
Deviation along tape, Left or right		ΔS	≤1.3	
Tape width		W	18.0+1.0/-0.5	
Hold-down tape width		W0	≥7.0	
Hole position		W1	9.0+0.75/-0.5	
Hole-down tape position		W2	≤3.0	
Height of component from tape center	Straight lead	H	18.0+2/-0	
	Kinked lead	H0	16.0±0.5	
Component height		H1	≤32.25	
Feed hole diameter		D0	4.0±0.3	
Total tape thickness		t1	≤0.9	Ground paper: 0.5±0.1mm
Total thickness, tape and lead wire		t2	≤1.5	
Length of snipped		L	≤11.0	