JVR ZINC OXIDE VARISTORS

Zinc oxide varistor is a voltage dependent resistor with symmetrical voltage-current characteristics that is designed to protect all kinds of electronic devices or elements from switching and induced lightning surges. Its non linear exponent characteristic with broad using range and mass production is gradually being used by various level of electric engineering.

JVR氧化鋅壓敏電阻

氧化鋅壓敏電阻又稱「突波吸收器」,係一種具有電壓-電流對稱特性之電壓屬性電阻器。它主要的設計是用來保護所有的電子產品或元件免於受開關或雷擊誘發所產生之突波的影響,而其非線性指數的特性與廣泛的應用範圍以及可以量產等優點,已逐漸地被應用在各種不同領域的電子工程方面。

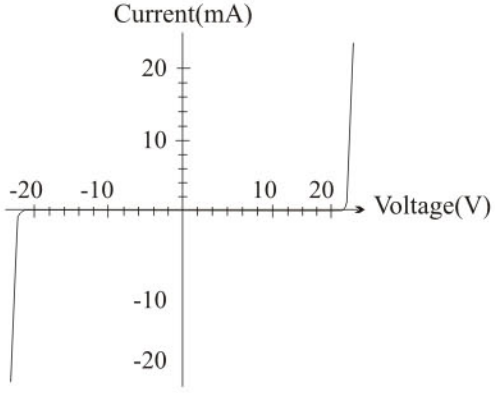
FEATURES

- Fast response time.
- Low leakage current.
- Excellent voltage ratio.
- Wide voltage & energy ratio.
- Low standby power and no follow on current.
- High performance in surge current handling capability.
- High performance in clamping voltage characteristics.

特性介紹

- 反應時間快速。
- 低漏電流。
- 優越之電壓比。
- 寬廣之電壓及能量比。
- 低備用電力且無後續電流。
- 高效能之突波電流處理能力。
- 抑制電壓特性之穩定執行能力。

V-I Characteristics of varistor

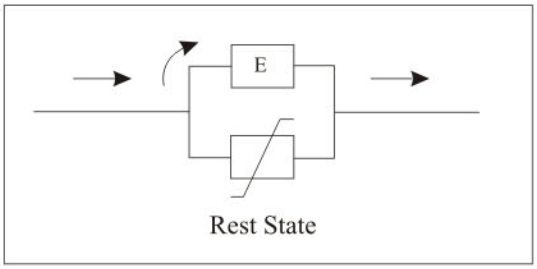


壓敏電阻之V-I特性

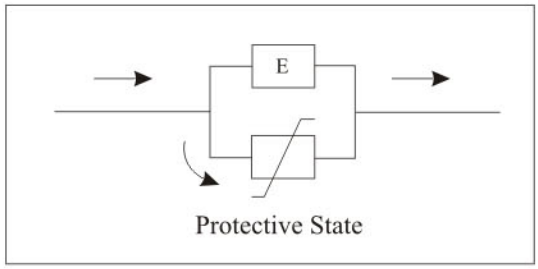
(如左圖)

The varistor's rest state has a high impedance(several megaohms) in relation to the component to be protected and does not change the characteristics of the electric circuit. In the presence of transient voltage (over the breakdown voltage of varistor), the varistor then has a low impedance (a few ohms) and short circuits, i.e. the assembly E to be protected.

壓敏電阻在休息狀態時,相對於受保護的電子元件而言,具有很高的阻抗(數兆歐姆)而且不會改變原設計之電路特性。但當瞬間突波電壓出現(超過壓敏電阻之崩潰電壓時),該壓敏電阻之阻抗會變低(僅有幾個歐姆而已)並造成原線路短路;換言之;電子產品或元件E因此而受到保護(如下圖)。

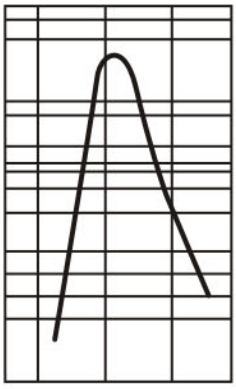


Rest State



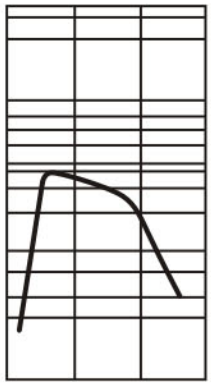
Protective State

Surge suppression of varistor



Time 時間

壓敏電阻之突波抑制功能



Time 時間

PARAMETERS DEFINITION

Varistor Voltage (breakdown voltage):

The varistor voltage is the voltage across the varistor measured at a specified current Ic (0.1mA or 1mA) of specified duration.

Maximum allowable voltage:

The Maximum allowable voltage corresponds to the rest state of the varistor. The rest state voltage offers a low leakage current in order to limit the power consumption of the protected device and not to disturb the circuit to be protected.

Non linear exponent (α):

The varistor voltage-current characteristic is defined by the equation: $I=KV^{\alpha}$ where K is a constant dependent on geometry, and α is the non linear exponent. We usually take two points (V_1,I_1), (V_2,I_2) to estimate the value of α.

$$\alpha=\frac{\log I_1/I_2}{\log V_1/V_2}$$

In which I_1 and I_2 are the current value corresponding to the voltage value V_1 and V_2.

Maximum clamping voltage:

Maximum clamping voltage is the maximum voltage Vp between two terminals with the specified standard impulse current Ip (8x20 μ sec). The voltage value is an indication on the protective function of the varistor.

Energy(Joule):

Maximum energy from one or a burst of pulses. It is the value within the varistor change of ±10% when one impulse of 10x1000 μ sec is applied.

E = K × Vm × Im × T

E : Energy(Joule)

K : Constant = 1.4

Vm : Max. clamping voltage at Im.

Im : Max. allowable single surge current of 10x1000 μ sec.

T : Duration of surge current (1000 μ sec)

參數名詞解釋

壓敏電壓(即崩潰電壓):

壓敏電壓係以一定的電流Ic(0.1mA或1mA)於一定的時間內通過壓敏電阻所量取之電壓。

最高工作電壓:

最高工作電壓表示壓敏電阻在該電壓之下仍爲休息狀態。休息狀態之壓敏電阻僅有很小的漏電流,以限制受保護電子產品之電力消耗,同時不致干擾到受保護的線路。

非線性指數(即α 值):

壓敏電阻之電壓-電流(V-I)特性係由公式$I=KV^{\alpha}$所定義的, K是一幾何常數,而α則是非線性指數。吾人通常截取二點(V_1,I_1)及(V_2,I_2)來計算其α值,

即 $$\alpha=\frac{\log I_1/I_2}{\log V_1/V_2}$$

I_1及I_2係電壓等於V_1及V_2時相對應之電流值。

最高抑制電壓:

最高抑制電壓係以一定之標準衝擊電流Ip(8x20 μ sec)於壓敏電阻二條引線端點之間所量得的最高電壓Vp。該電壓值同時也是壓敏電阻發揮其保護功能的一項指標。

能量(即焦耳值):

表示一次脈衝之最大能量,亦即以10x1000 μ sec衝擊一次而壓敏電壓之變化仍在10%以內之焦耳值。其公式:

E = K×Vm×Im×T

E : 能量(焦耳)

K : 常數,約等於1.4。

Vm : 電流在Im時之最高抑制電壓。

Im : 最大允許之10x1000 μ sec單一突波電流。

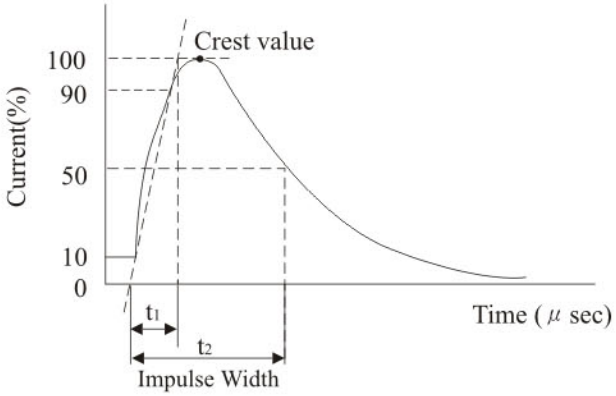
T : 突波電流延續時間(1000 μ sec)

Withstanding surge current:

Withstanding surge current is the maximum peak current for the varistor with the specified standard impulse current (8x20 μ sec) applied one time or two times and corresponding to a permissible variation of 10% in the varistor voltage change.

耐突波電流(即突波耐量):

突波耐量乃壓敏電阻以一定之標準衝擊電流(8x20 μ sec)衝擊1次或2次時,壓敏電壓之變化在10%以內的最大脈衝電流。



（如左圖）

t_1=8 t_2=20 for 8 × 20 μ sec
t_1=10 t_2=1000 for 10 × 1000 μ sec

Rated wattage

The maximum power that can be applied within the specified ambient temperature.

額定功率(即瓦特數):

表示在一定的環境溫度下所能消耗的最大功率。

Capacitance

The capacitance of varistor is the reference value measured between the varistor terminals at specified frequency.

電容值:

壓敏電阻之電容值係以一定的頻率於引線端點之間所量得的參考值。

Pulse lifetime rating

This is expressed as the maximum allowable number of impulse currents applied. 8x20 μ sec impulse current (or 10x1000 μ sec) is applied at prescribed interval. This curve also provides for derating current as required with repetitive pulsing.

額定脈衝壽命:

表示壓敏電阻以8x20 μ sec.（或10x1000 μ sec.）的衝擊電流,依規定的間隔時間連續給予衝擊時所能承受之最高衝擊次數。其受衝擊時所呈現的曲線同時也提供了連續衝擊每次所需求的遞減電流。

GENERAL CHARACTERISTICS

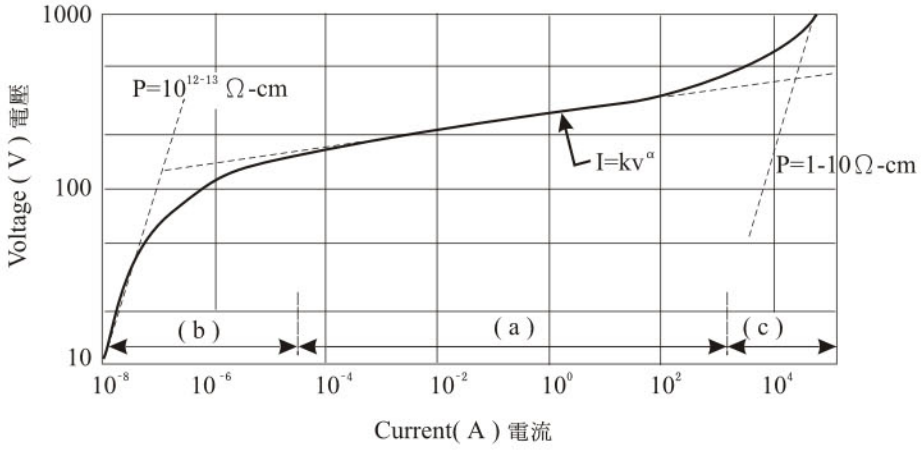
- Storage temperature : -40℃~+125℃
- Max. response time : 25 n sec.
- Max. operating temperature : -40℃~+125℃
- Temp. coefficient of voltage : 0~0.05% / ℃ max.
- Max. working surface temperature. : +115℃
- Insulation resistance(at DC 500V) : Over 1000MΩ

JVR壓敏電阻之一般特性

- 儲存溫度:-40℃~+125℃
- 最大反應時間:25n sec.
- 最高工作溫度:-40℃~+125℃
- 電壓溫度係數:0~0.05% / ℃ max.
- 最高表面溫度:+115℃
- 絕緣電阻(DC 500V):1000MΩ以上

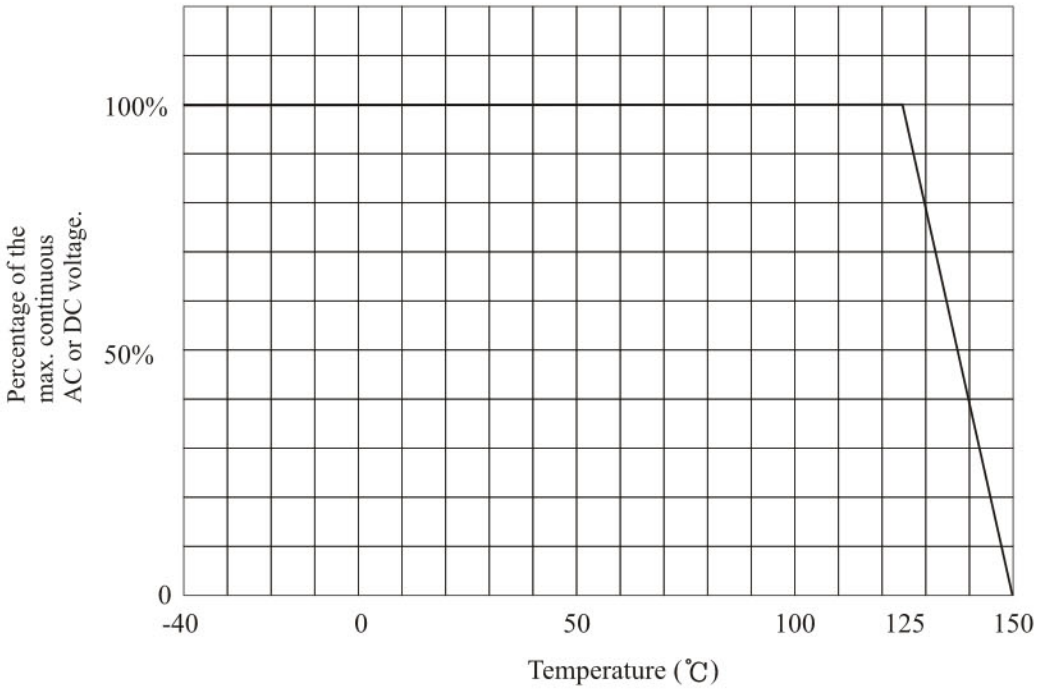
CURRENT-VOLTAGE CHARACTERISTICS

電流-電壓特性曲線



(a) Varistor action region
壓敏電阻工作區
(b) Prebreakdown region
預先崩潰區
(c) Upturn region
電壓上揚區

MAX. CONTINUOUS AC or DC VOLTAGE WITH TEMPERATURE



SOURCE OF SURGE VOLTAGE

- Direct lightning surges.
- Surge voltage by grounding fault.
- From magnetic induction.
- Induced lightning surges.
- Surge voltage by switching operation.
- From electrostatic induction.

突波電壓之來源

- 直接雷擊所產生的突波。
- 接地不良所產生的突波。
- 各種磁性所誘發的突波。
- 因雷擊間接誘發的突波。
- 開關電源所產生的突波。
- 靜電特性所誘發的突波。