Typical TVS Design Aids

1) Leakage current will double for every 10 to 15°C rise in temperature, depending upon the voltage (usually referenced to the ambient temperature).

2) The typical change in Breakdown Voltage (BV or $V_{(BR)}$) with variations in temperature is defined by the following equations:

BV (actual value) - 4 { + mv/°C}: (temperature coefficient)

This applies to voltages greater than 6 volts. The temperature coefficient does not apply to the clamping voltage as the current derating factor takes into account any rise in voltage due to thermal effects

3) The Peak Pulse Power (P_{PP}) or Peak Pulse Current (I_{PP}) rating will triple for every 1/10 (decade) decrease in impulse width.

4) The Peak Pulse Power (P_{PP}) is calculated by multiplying the Peak Pulse Current (IPP) times the Maximum Clamping Voltage (V_C). Note the current is not coincident in time with the voltage.

5) For design purposes the Maximum Clamping Voltage (V_C) is considered constant for peak pulse power ratings for the specified time duration range.

6) The Differential Clamping Voltage ($\Delta V_C = V_C - V_{BR}$) is composed of two (2) components, resistive (bulk material) and thermal. For low voltage devices (=<10V), approximately 1/3 of the Voltage rise is thermal. For higher voltage devices (about 200V), approximately 2/3 of the voltage rise is thermal.

7} The Maximum Clamping Voltage (V_C) is 1.33 times the actual Breakdown Voltage ($V_{(BR)}$) at full rated power. At half (50%) rated power the clamping factor is 1.20 times the Breakdown Voltage.

8} Capacitance will decrease as frequency Increases. At zero bias. the rate of change is about 8%, and with a reverse bias, the rate of change can vary from 30-50%.

9} The Minimum Breakdown Voltage ($V_{(BR)}$) is calculated by multiplying the Stand-Off Voltage (V_{WM}) times 1.11. The Maximum Breakdown voltage is calculated by multiplying the Minimum Breakdown Voltage by 1.1 for a typical 5% (premium) product and by 1.22 for a typical 10% (common) product.

10) A transient voltage suppressor is normally selected according to its Rated Stand-off Voltage (V_{WM}) which should be equal to or greater than the continuous peak operating voltage level.