

**PROTECTION PRODUCTS**
**TVS Power Derating vs. Temperature**

Transient voltage suppressors are designed to work over a wide temperature range. If the application requires the TVS to operate at elevated temperatures, the characteristics of the device must be considered at the expected extremes.

**Power Derating Curve**

During surge conditions, the transient power is dissipated within the TVS diode and is limited by the maximum allowable junction temperature. If the ambient temperature is increased, the power dissipating capability of the device decreases. The peak pulse power capability of the device derates linearly from 25°C to  $T_{(max)}$ . To determine the power or current handling capability of the device at elevated temperatures, a power derating curve is used (Figure 1). For example, at an operating temperature of 100°C, the device is capable of dissipating 40% of the rated peak pulse current.

**Clamping Voltage**

Device clamping voltage is normally specified for a junction temperature of 25°C before surge. To extrapolate for other junction temperatures, the following formula may be used :

$$\Delta V_{BR} = \alpha T_{(VBR)} * (T_j - 25) * V_{BR}$$

Where :

$\Delta V_{BR}$  = Change in voltage (V)

$\alpha T_{(VBR)}$  = Temperature coefficient of breakdown voltage (V/°C)

$V_{BR}$  = Breakdown (or clamping) voltage (V)

