

**PROTECTION PRODUCTS**
**Transient Protection of MOSFETS**

One of the most common causes of failure in MOSFET devices results from exceeding the maximum drain - source voltage ( $V_{DS}$ ). Inductive load switching for example can cause transients which can force  $V_{DS}$  to exceed the maximum breakdown voltage of the MOSFET. If the transient contains enough energy, the MOSFET will be destroyed if it begins to avalanche.

**Drain-Source Protection**

One method of protecting the MOSFET is to connect a TVS diode from drain to source. To choose the correct TVS diode, use the following guidelines:

- The working voltage of the TVS diode ( $V_{rwm}$ ) must exceed the worst case supply voltage.
- The TVS diode clamping voltage ( $V_c$ ) must be less than the minimum breakdown voltage of the MOSFET under peak pulse current conditions.

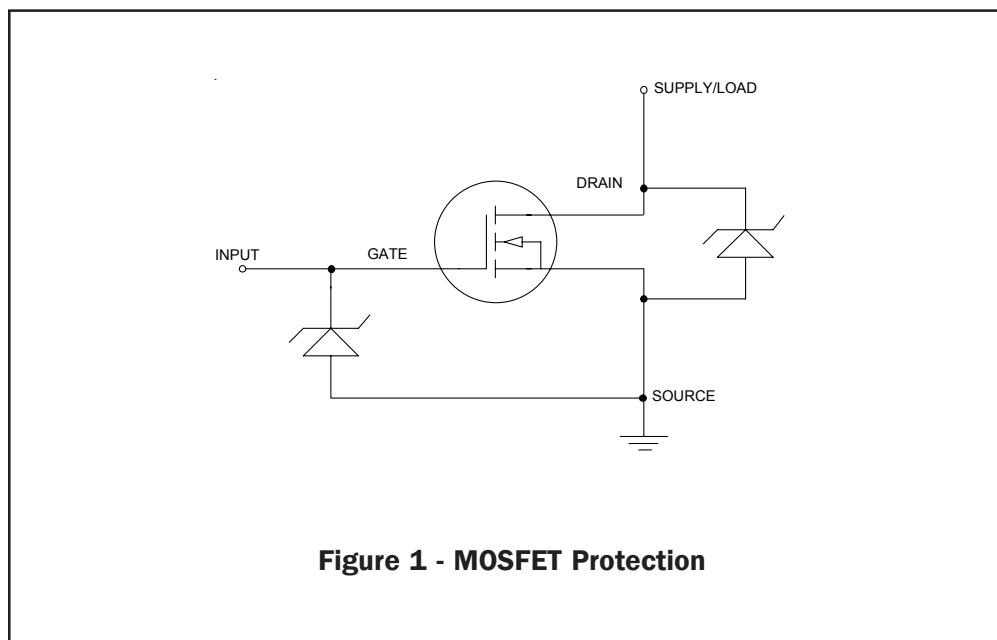
- For switching inductive loads and power supply applications, a 1500W ( $t_p = 10/1000\mu s$ ) TVS is recommended.

**Gate-Source Protection**

Transient on the input of the MOSFET can puncture the thin gate oxide of the device and melt the silicon.

Transients at the gate of the device are often due to electrostatic discharge (ESD). Connecting a TVS diode from gate to source can protect the MOSFET from input transients. Choose a suppressor with a working voltage which exceeds the MOSFET input voltage. For suppression of ESD, a device rated at 300W ( $t_p = 8/20\mu s$ ) will suffice.

A schematic diagram illustrating these protection techniques is shown in Figure 1.



**Figure 1 - MOSFET Protection**