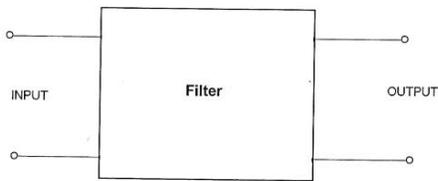


TVS PROTECTION OF FILTERS

A filter is a circuit designed to selectively separate or eliminate a frequency or range of frequencies that is desired for the proper operation of a device or system.

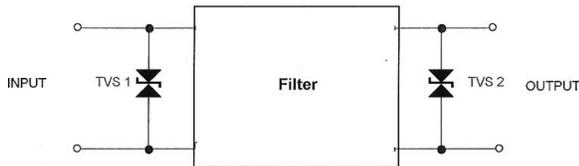
Filters can be subjected to all sorts of Impulses and Surges. Filters are used to remove the undesirable frequency components for the suitable operation of some systems.

Many times it is necessary to provide protection when using a filter. The filter will usually provide the frequency control required but due to transients and the pulse response of the filter it may be necessary limit the input and to control the output when the filter is connected to a sensitive load,



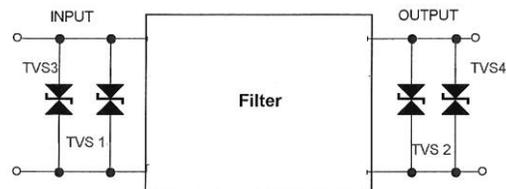
The filters described are basic and simplified and are shown to indicate how protection can be applied.

A Lowpass filter will have good low frequency response and limit high frequencies but the pulse response may be poor and there may be spurious outputs when subjected to high voltage impulses. There is usually no input or output suppression.



Alternate 1

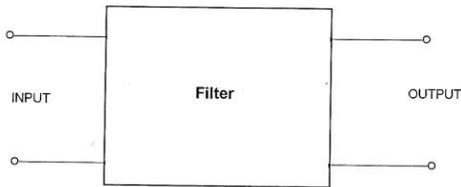
Alternate 2



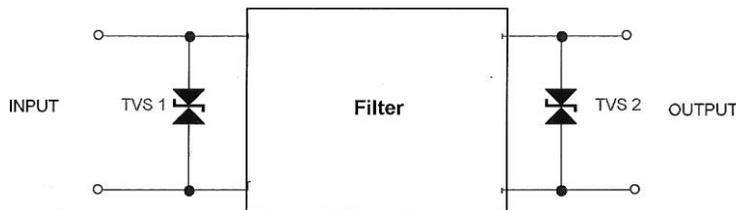
This filter example will have like the previous may have good low frequency response but there will be control of the input and will limit the output to the voltage required for the application. There may be some impulses on the input but the output max voltage will be controlled by TVS 2 which will be chosen to limit the maximum voltage as designed. Or Two TVS can be connected in parallel at the input and output to further protect the filter.

TVS PROTECTION OF FILTERS

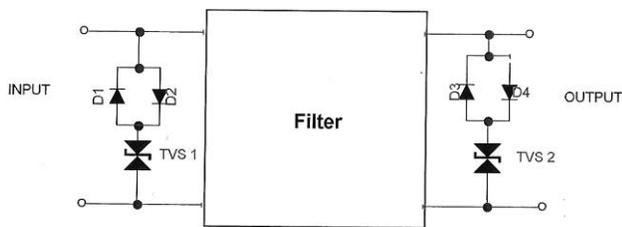
The same logic can be applied to High Pass and Band Pass filters, an example follows:



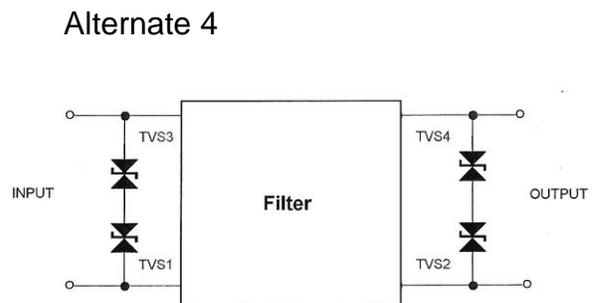
In this case a TVS that is applicable for High Frequency applications would be applied and there is input and output suppression.



If however the frequency of the application is beyond the rating of the TVS (The nominal TVS capacitance is too high) an alternative TVS could be chosen or diodes to isolate the TVS can be added to reduce the capacitance of the connected TVS as shown. But as an alternate two TVS can be connected in series to reduce the capacitive load



Alternate 3



Alternate 4

TVS PROTECTION OF FILTERS

A TVS can be applied to the output only but having an input TVS in all cases should make the filter function much better, and reduce the transients created within the filters.

In addition if the performance is not as desired and the let-thru voltage is too high, it may be prudent to add a second TVS in parallel at the location needed.

Note:

These TVS as applied to filters can also be applicable to any other type of protection that is required.