= Prototype filter =

Prototype filters are electronic filter designs that are used as a template to produce a modified filter design for a particular application . They are an example of a nondimensionalised design from which the desired filter can be scaled or transformed . They are most often seen in regard to electronic filters and especially linear analogue passive filters . However , in principle , the method can be applied to any kind of linear filter or signal processing , including mechanical , acoustic and optical filters .

Filters are required to operate at many different frequencies , impedances and bandwidths . The utility of a prototype filter comes from the property that all these other filters can be derived from it by applying a scaling factor to the components of the prototype . The filter design need thus only be carried out once in full , with other filters being obtained by simply applying a scaling factor .

Especially useful is the ability to transform from one bandform to another . In this case , the transform is more than a simple scale factor . Bandform here is meant to indicate the category of passband that the filter possesses . The usual bandforms are lowpass , highpass , bandpass and bandstop , but others are possible . In particular , it is possible for a filter to have multiple passbands . In fact , in some treatments , the bandstop filter is considered to be a type of multiple passband filter having two passbands . Most commonly , the prototype filter is expressed as a lowpass filter , but other techniques are possible .

Parts of this article or section rely on the reader 's knowledge of the complex impedance representation of capacitors and inductors and on knowledge of the frequency domain representation of signals .

= = Low @-@ pass prototype = =