

HP4F

4-POLE, 4-ZERO FLAT HIGH-PASS FILTER



DESCRIPTION

The HP4F 4-pole, 4-zero High-Pass filter has a flat pass-band with no ripple and 80 dB stop-band attenuation at 0.1682 times the cutoff frequency (F_c). The HP4F can be used to reject low-frequency interfering signals that are close to the pass-band.

Of all filters of similar complexity (number of poles and zeros) and minimum stop-band attenuation, the HP4F achieves the flattest pass-band and sharpest transition from pass-band to stop-band than any other filter. The result is a very selective filter with pass-band flatness exceeding the Butterworth yet with much sharper roll-off.

Cascade an HP4F with an LP4F to form a band-pass filter. If the filters are set with the -0.1 dB frequencies overlapping, the resulting band-pass filter will have 0.2 dB of insertion loss and will provide more than 80 dB of attenuation below $0.107 F_c$ and above $9.364 F_c$. If they are set to the same cutoff frequency, the band-pass filter will have 6.02 dB insertion loss and will provide more than 80 dB attenuation below $0.168 F_c$ and $5.94 F_c$ with a Q of 2.32.

SPECIFICATIONS

Filter Type:	4-pole, 4-zero Flat High-Pass
Cutoff Frequency Amplitude:	-3.01 dB
Pass-Band Ripple:	0 dB
High Frequency Gain:	0 dB
Stop-Band Frequency:	0.1682 F_c
Stop-Band Attenuation:	80 dB minimum
Cutoff Frequency Phase:	180° (Lead)
10% Settling Time (SEC):	0.784/F_c
5% Settling Time (SEC):	1.257/F_c
2% Settling Time (SEC):	1.387/F_c
1% Settling Time (SEC):	1.860/F_c
0.1 % Settling Time (SEC):	2.917/F_c
-0.1 dB Frequency:	1.575 F_c
-0.2 dB Frequency:	1.448 F_c
-0.5 dB Frequency:	1.291 F_c
-1 dB Frequency:	1.178 F_c
-2 dB Frequency:	1.067 F_c
-3.01 dB Frequency:	1.000 F_c
-20 dB Frequency:	0.5743 F_c
-40 dB Frequency:	0.3384 F_c
-60 dB Frequency:	0.2175 F_c
-80 dB Frequency:	0.1682 F_c



