

The first order Butterworth filter for $\Omega_c = 1 \text{ Rad/sec}$ is $H(s) = \frac{1}{s+1}$.

The high pass filter for $\Omega_c = \Omega_p = 7265 \text{ Rad/sec}$ can be obtained by using the transformation

$$s \rightarrow \frac{\Omega_c}{s}$$

$$s \rightarrow \frac{7265}{s}$$

The transfer function of HPF,

$$H(s) = \frac{1}{s+1} \Big|_{s=\frac{7265}{s}}$$

$$= \frac{s}{s+7265}$$

Using bilinear transformation,

$$H(z) = H(s) \Big|_{s=\frac{2}{T} \left(\frac{1-z^{-1}}{1+z^{-1}} \right)}$$

~~$$= \frac{1000 \left(\frac{1-z^{-1}}{1+z^{-1}} \right)}{1000 \left(\frac{1-z^{-1}}{1+z^{-1}} \right) + 7265}$$~~

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$$H(z) = \frac{0.5792 (1-z^{-1})}{1-0.1584 z^{-1}}$$