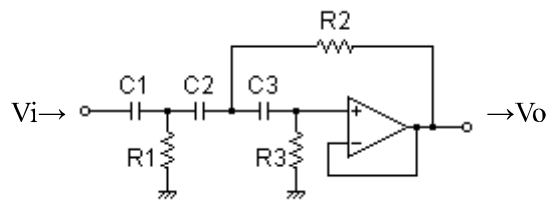


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3rd order Sallen-Key High-pass Filter Design Tool - Result -

Calculated the Transfer Function for the 3rd order Sallen-Key High-pass filter, displayed on graphs, showing Bode diagram, Nyquist diagram, Impulse response and Step response

3rd order Sallen-Key filter



Transfer Function:

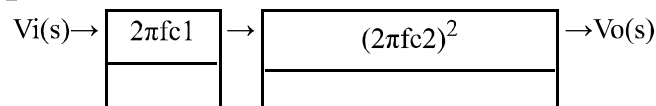
$$G(s) = \frac{s^3}{s^3 + 226.00509398072s^2 + 25488.357693278s + 1447379.766796}$$

\$49.54	\$92.70
\$185.64	\$37.83

DigiKey
DigiKey

R1 = 42.2kΩ
R2 = 16.5kΩ
R3 = 294kΩ
C1 = 0.15uF
C2 = 0.15uF
C3 = 0.15uF

Equivalent block diagram:



Select filter type

☒ Set parameters of the equivalent block diagram

1st filter:

$f_{c1} = 18$ Hz

2nd filter:

$f_{c2} = 18$ Hz

Damping ratio $\zeta =$
0.5

☐ Butterworth filter

Cut-off frequency $f_c =$ Hz

$$s+2\pi f_{c1}$$

$$s^2+2\zeta(2\pi f_{c2})s+(2\pi f_{c2})^2$$

Cut-off frequency f_{c1} , f_{c2} of equivalent block diagram:

$$f_{c1} = 18.110722132921[\text{Hz}]$$

$$f_{c2} = 17.949549885195[\text{Hz}]$$

Damping ratio ζ of equivalent block diagram:

$$\zeta = 0.49748060124867$$

Pole(s)

$$p = -8.9295528690297 + 15.570787605009i[\text{Hz}]$$

$$|p| = 17.949549885195[\text{Hz}]$$

$$p = -18.110722132921[\text{Hz}]$$

$$|p| = 18.110722132921[\text{Hz}]$$

$$p = -8.9295528690297 - 15.570787605009i[\text{Hz}]$$

$$|p| = 17.949549885195[\text{Hz}]$$

Zero(s)

$$z = 0[\text{Hz}]$$

$$|z| = 0[\text{Hz}]$$

$$z = -0[\text{Hz}]$$

$$|z| = 0[\text{Hz}]$$

$$z = -0[\text{Hz}]$$

$$|z| = 0[\text{Hz}]$$

☐ Chebyshev filter

Characteristic frequency $f_c =$ Hz

Gain ripple $gr =$ dB

$C1 =$ 150n F $C2 =$ 150n F

$C1$, $C2$ is optional. But when setting these capacitances, $C1$ and $C2$ of both are needed.

Select Capacitor Sequence: E6

Select Resistor Sequence: E96

Frequency analysis

- ☒ Bode diagram
- ☒ Phase ☐ Group delay
- ☒ Nyquist diagram
- ☒ Pole, zero
- ☒ Phase margin
- ☒ Oscillation analysis

Analysis on frequency range:

$f1 =$ 1 $\sim f2 =$ 40 [Hz] (optional)

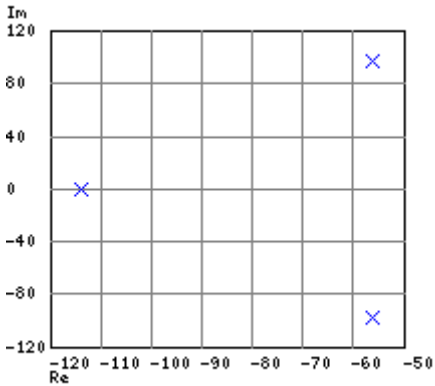
Transient analysis

- ☒ Step response
- ☐ Impulse response
- ☒ Overshoot
- ☒ Final value of the step response

Analysis on time range:

0~ [sec] (optional)

Poles

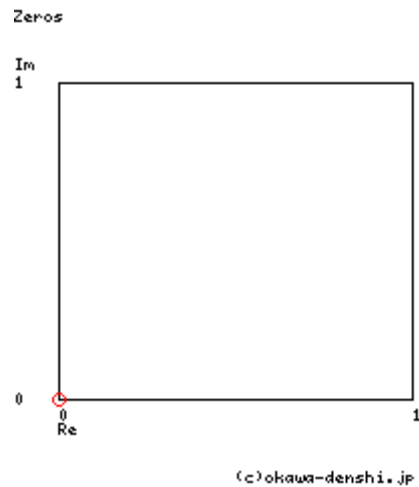


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Calculate



Complete your collection
eBay



Phase margin

$$pm = \text{INF}[\text{deg}] \ (f=0[\text{Hz}])$$

Oscillation frequency

$$f = 15.570787605009[\text{Hz}]$$

Overshoot (in absolute value)

The 1st peak $g_{pk} = -0.31$ ($t=0.015[\text{sec}]$)

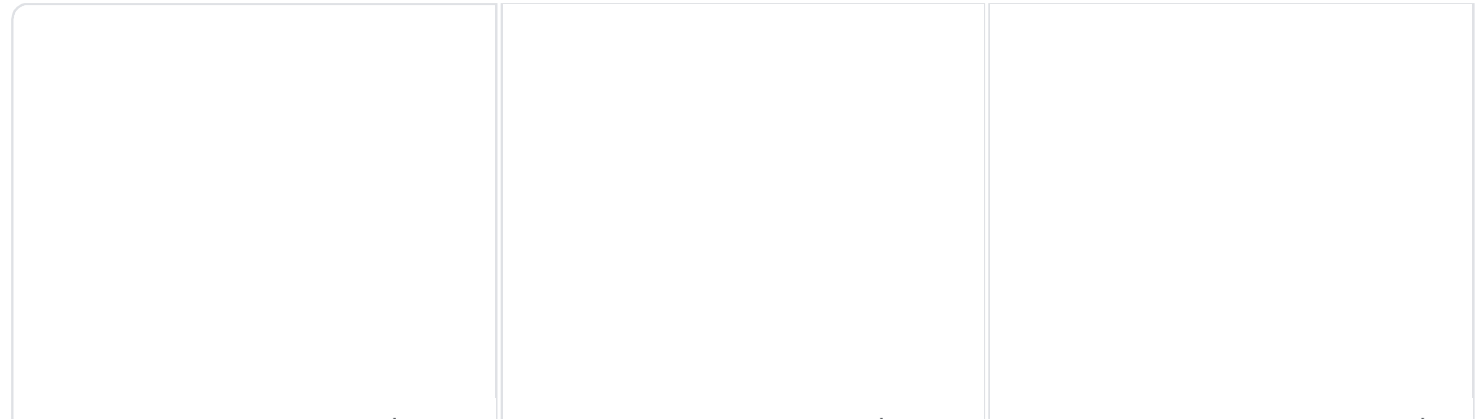
The 2nd peak $g_{pk} = 0.098$ ($t=0.042[\text{sec}]$)

The 3rd peak $g_{pk} = -0.015$ ($t=0.075[\text{sec}]$)

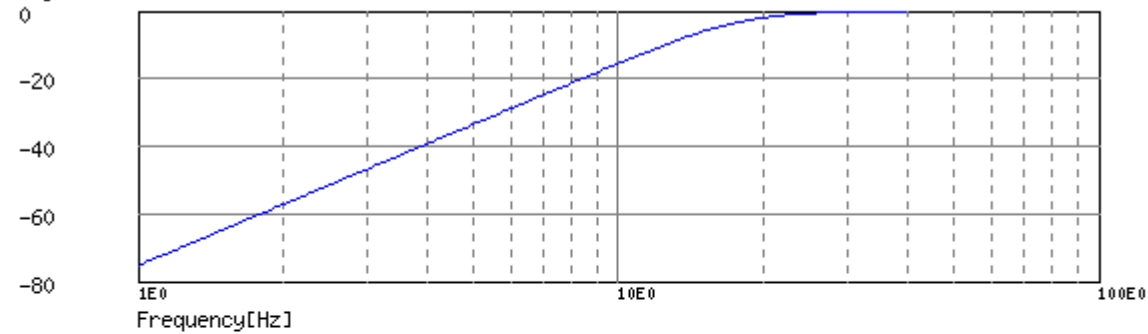
Final value of the step response (on the condition that the system converged when t goes to infinity)

$$g(\infty) = 0$$

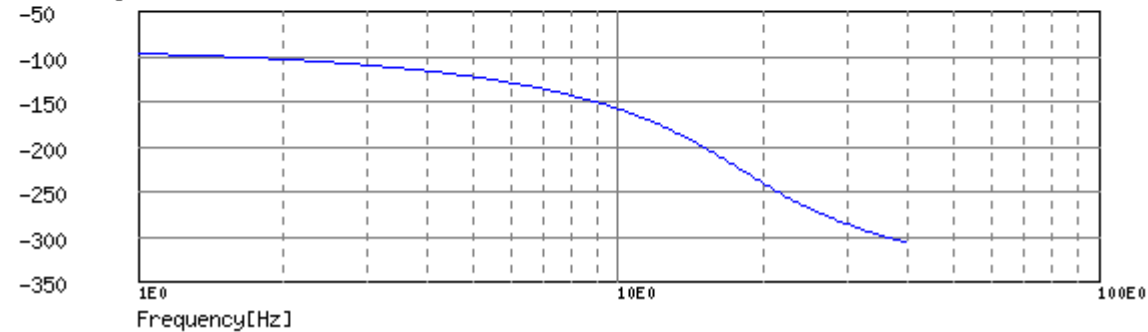
Frequency analysis

**BodeDiagram**

Magnitude[dB]



Phase[deg]

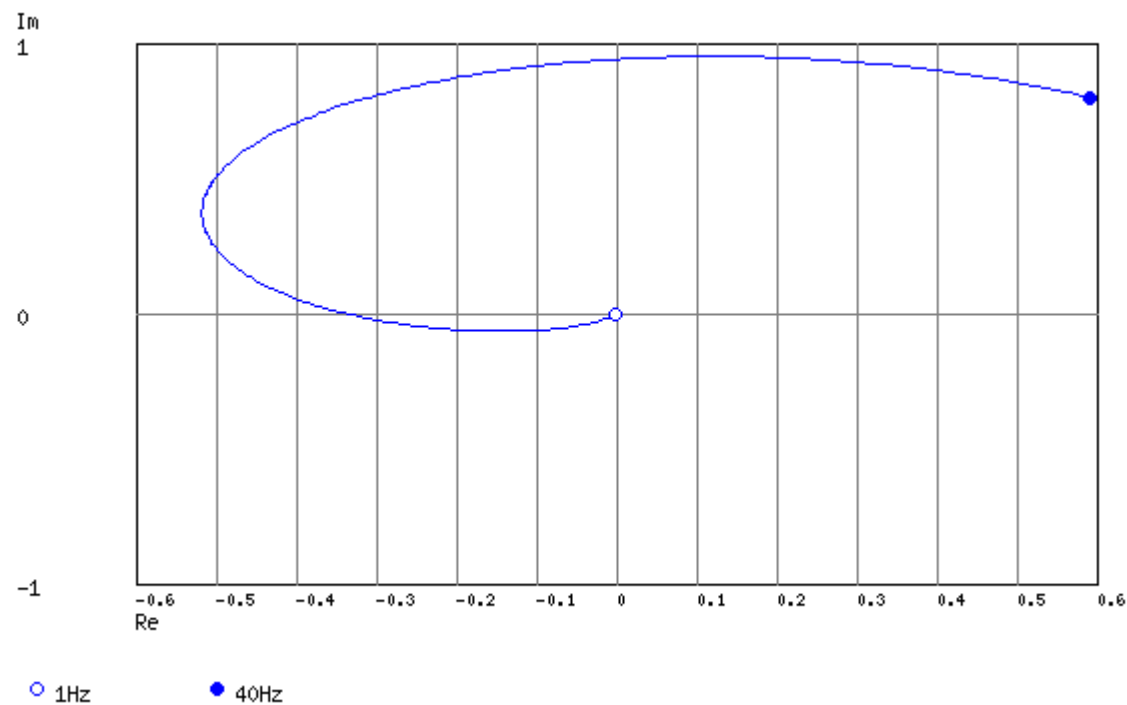


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[Gain characteristics at the Bode Diagram](#) (provides up to 1 minute)

[Phase characteristics at the Bode Diagram](#) (provides up to 1 minute)

[Bode Diagram text data](#) (provides up to 1 minute)

NyquistDiagram

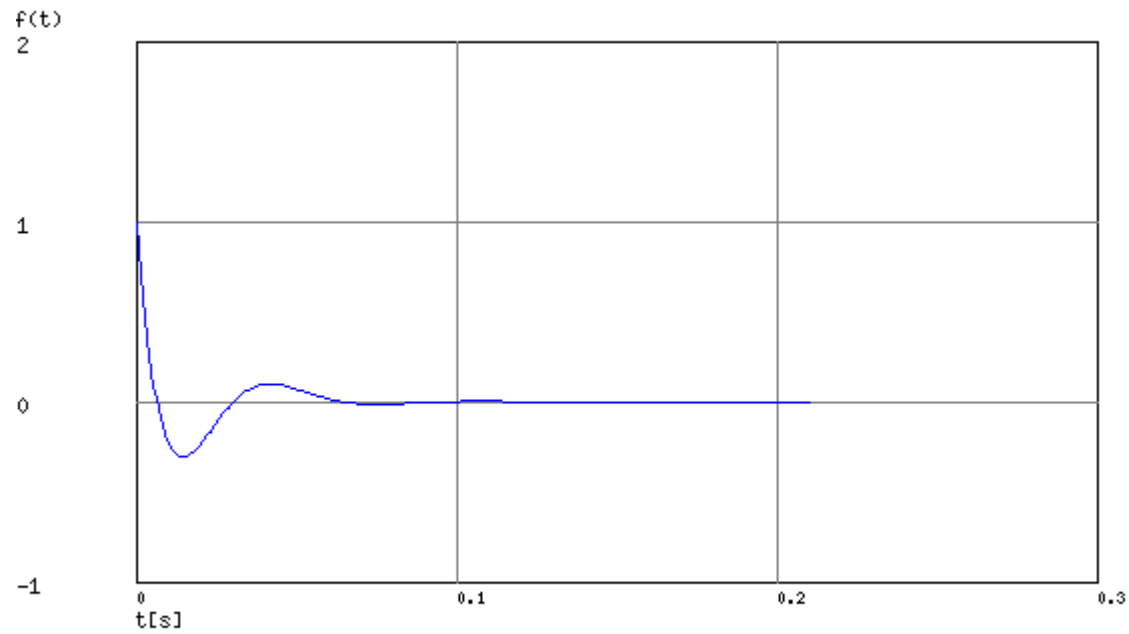
[Nyquist Diagram text data](#) (provides up to 1 minute)

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Transient analysis

The Brightest

Maximize Your Visibility
Mechanic-Grade Heat

StepResponse

[Step Response text data](#) (provides up to 1 minute)

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Suggestion box

We'll use your suggestion to improve site quality in future.



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