How to Design Inverting Amplifier Circuit

General Purpose Amplifiers

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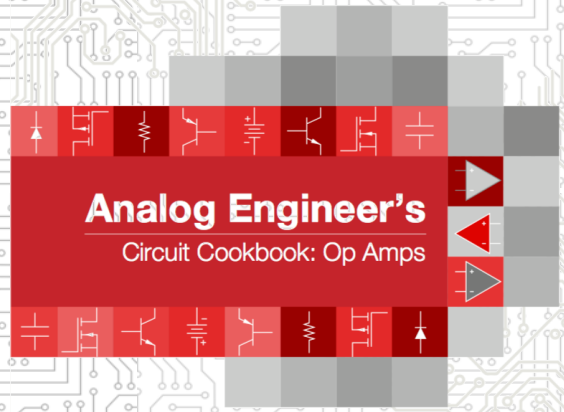
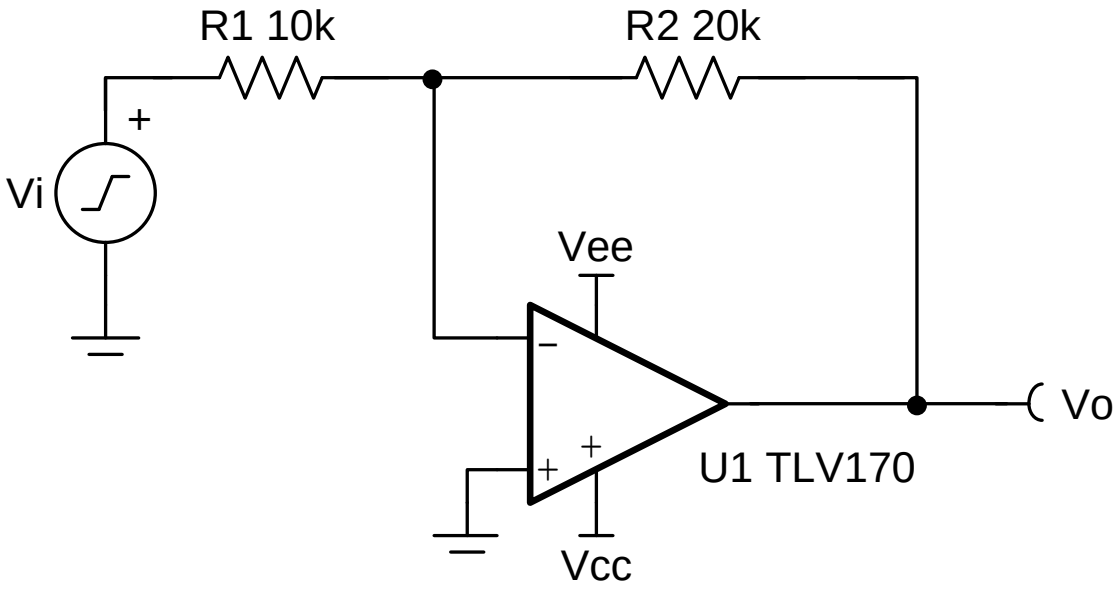


Circuit Description



$$V_o = -\frac{R_2}{R_1} \times V_i$$

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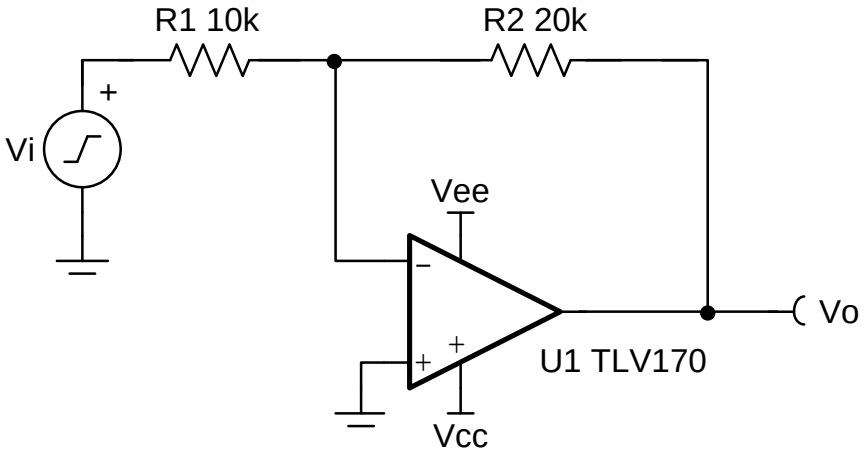
Design Steps

Input		Output		Supply		Freq.
V_{iMin}	V_{iMax}	V_{oMin}	V_{oMax}	V_{cc}	V_{ee}	f
-7V	7V	-14V	14V	15V	-15V	3kHz



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Design Steps

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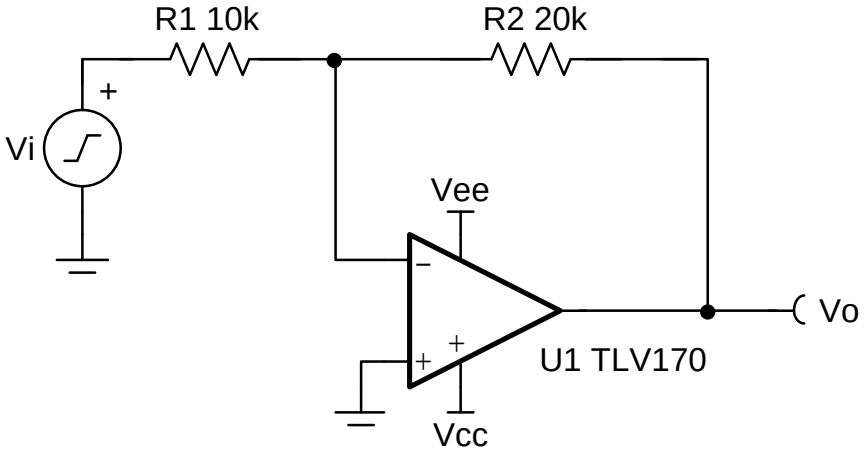

$$G = \frac{V_{oMax}}{V_{iMin}}$$

$$G = \frac{14V}{-7V} = -2V/V$$

Design Steps

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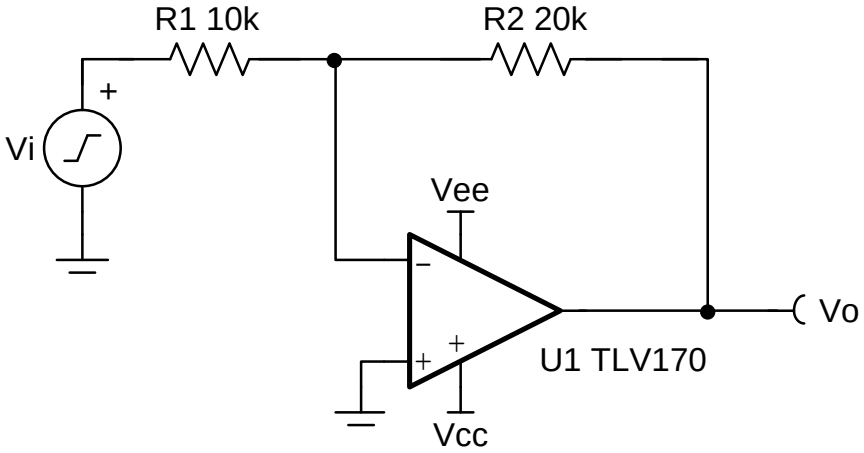


$$G = -\frac{R_2}{R_1}$$

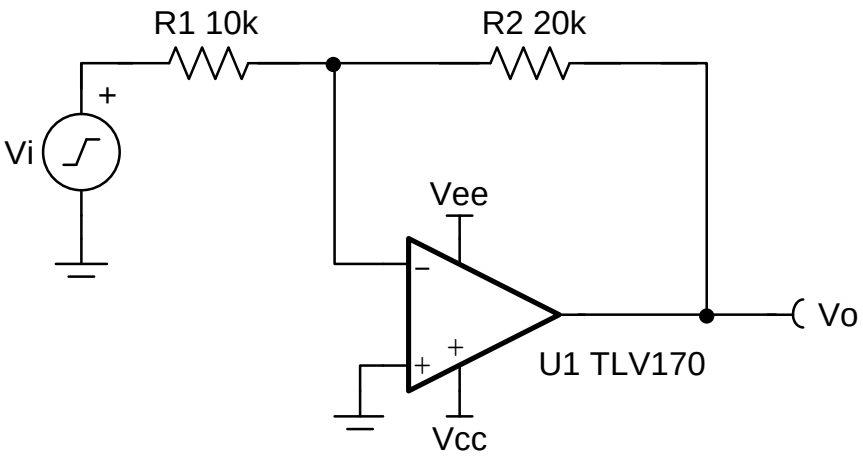
$$R_2 = -G \times R_1 \rightarrow G \times R_1$$

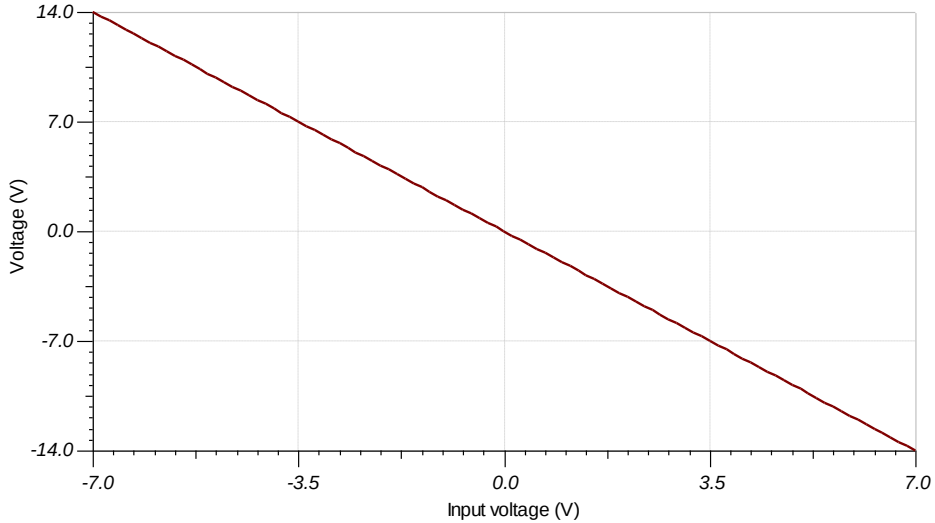
$$R_1 = 10k\Omega$$

$$R_2 = 20k\Omega$$

DC Results

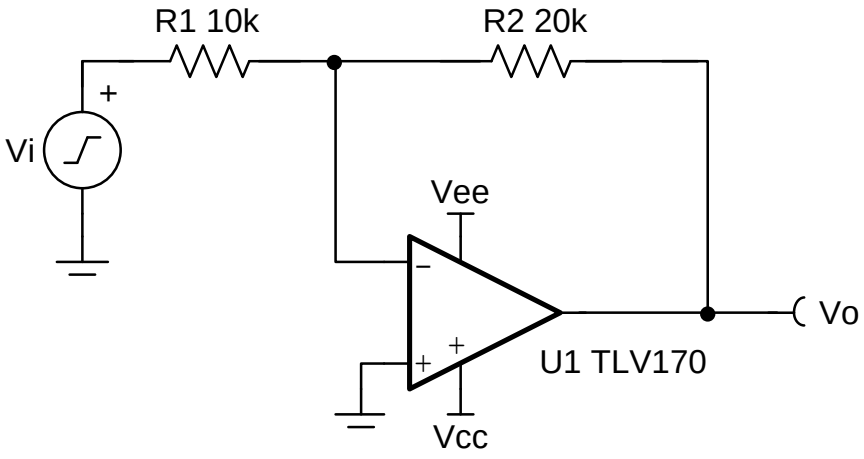
Input		Output		Supply		Freq.
V_{iMin}	V_{iMax}	V_{oMin}	V_{oMax}	V_{cc}	V_{ee}	f
-7V	7V	-14V	14V	15V	-15V	3kHz

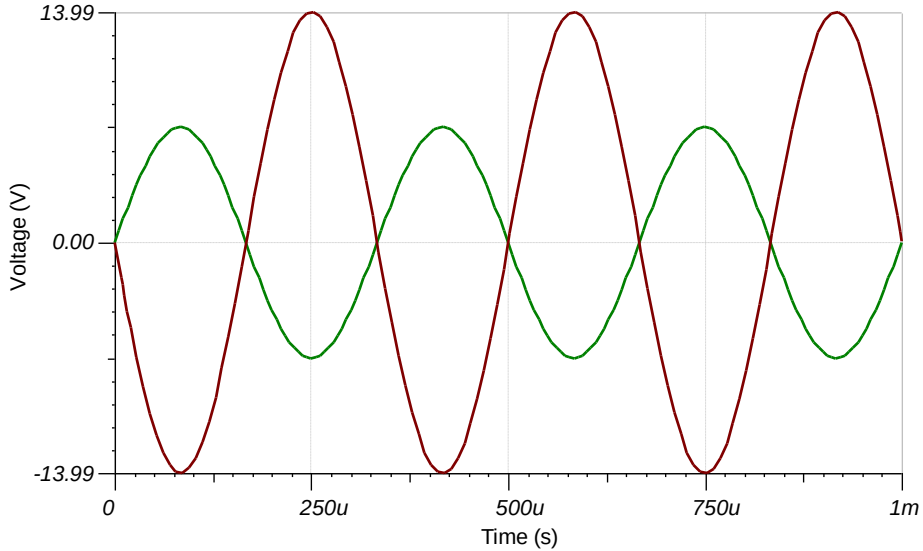




Transient Results

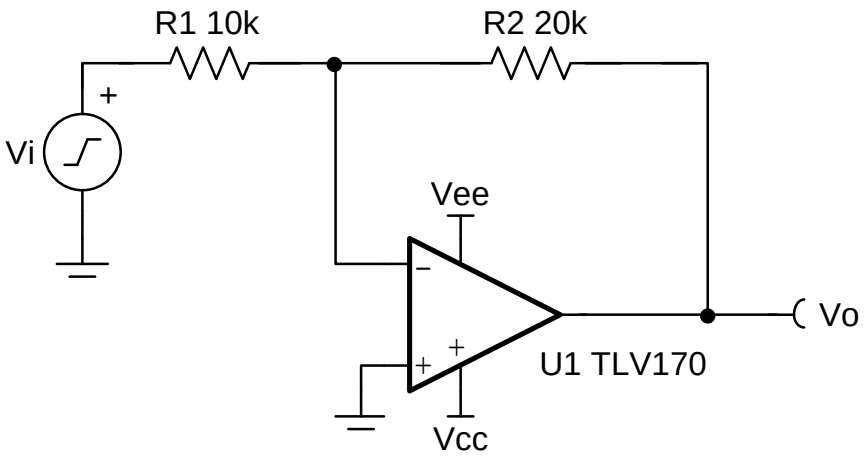
Input		Output		Supply		Freq.
V_{iMin}	V_{iMax}	V_{oMin}	V_{oMax}	V_{cc}	V_{ee}	f
-7V	7V	-14V	14V	15V	-15V	3kHz

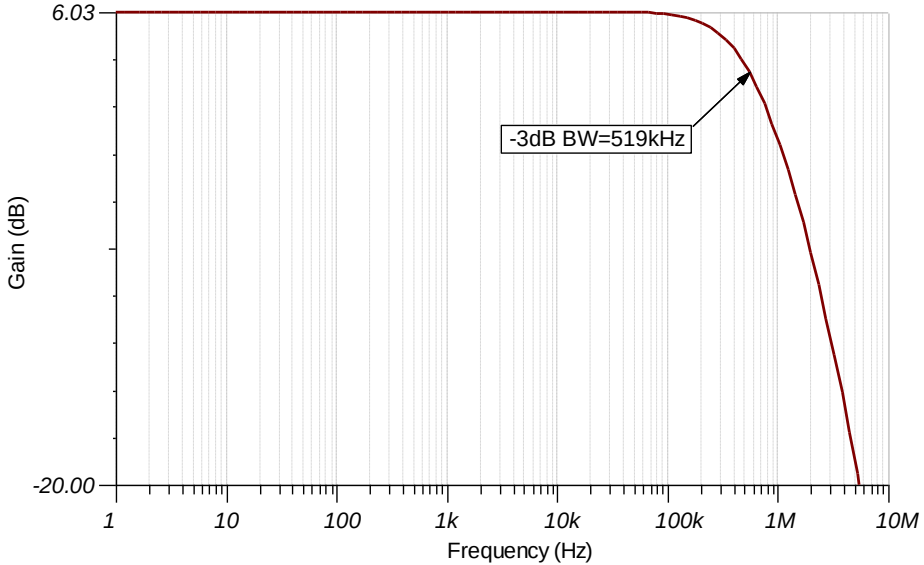




AC Results

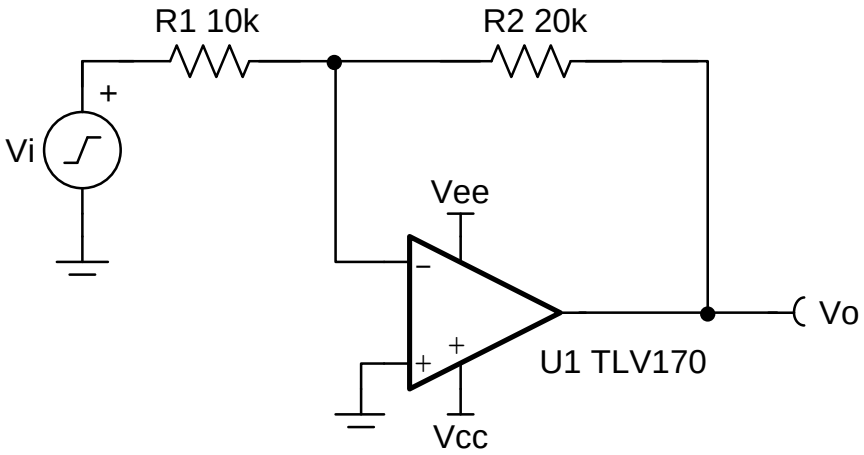
Input		Output		Supply		Freq.
V_{iMin}	V_{iMax}	V_{oMin}	V_{oMax}	V_{cc}	V_{ee}	f
-7V	7V	-14V	14V	15V	-15V	3kHz





Design Notes

Input		Output		Supply		Freq.
V_{iMin}	V_{iMax}	V_{oMin}	V_{oMax}	V_{cc}	V_{ee}	f
-7V	7V	-14V	14V	15V	-15V	3kHz



Design Notes:

1. Small-signal bandwidth is determined by the noise gain (or non-inverting gain) and op amp gain-bandwidth product (GBP). A capacitor in parallel with R2 helps filter the input and stabilize the circuit.

2. Large signal performance can be limited by slew rate. Therefore, check the maximum output swing versus frequency plot in the data sheet to minimize slew-induced distortion

3. The common-mode voltage is equal to the voltage at the non-inverting input. In this circuit the common-mode voltage does not vary with input voltage.

Design Resources

EE Cookbook: Op Amp
www.ti.com/circuitcookbooks
Step-by-step circuit design of common op amp building block circuits.

TI Designs
www.TI.com/tidesigns
Ready-to-use reference designs with
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