How to Design
Full-wave rectifier circuit

General Purpose Amplifiers
www.ti.com/general-amps
www.ti.com/circuitcookbooks
Circuit Description
Design Goals

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
<th>Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{i\text{Min}}$</td>
<td>$V_{i\text{Max}}$</td>
<td>$V_{o\text{Min}}$</td>
</tr>
<tr>
<td>±25 mV</td>
<td>±10 V</td>
<td>25 mV</td>
</tr>
</tbody>
</table>

$V_o = |V_i|$
Design Steps

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$Vo = Vi$

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Design Steps

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<tr>
<td>$V_{i\text{Min}}$</td>
<td>$V_{o\text{Min}}$</td>
<td>$V_{cc}$</td>
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<tr>
<td>±25 mV</td>
<td>25 mV</td>
<td>15 V</td>
</tr>
<tr>
<td>$V_{i\text{Max}}$</td>
<td>$V_{o\text{Max}}$</td>
<td>$V_{ee}$</td>
</tr>
<tr>
<td>±10 V</td>
<td>10 V</td>
<td>-15 V</td>
</tr>
<tr>
<td>$V_{\text{ref}}$</td>
<td></td>
<td>0 V</td>
</tr>
</tbody>
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$$\frac{V_o}{V_i} = -\frac{R2}{R1}$$

$$R1 = R2 = 1 \text{ } k\Omega$$

$$R3 = 1 \text{ } k\Omega$$
## Transient Results

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<td>25mV</td>
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<td>$V_{i\text{Max}}$</td>
<td>$V_{o\text{Max}}$</td>
<td>$V_{ee}$</td>
</tr>
<tr>
<td>$\pm10,\text{V}$</td>
<td>10V</td>
<td>-15V</td>
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<td>$V_{\text{ref}}$</td>
<td></td>
<td>0V</td>
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![Circuit Diagram](image.png)

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Transient Results

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Design Notes:

1. For a full-wave rectifier circuit, be sure to use a fast switching diode for D1 and D2.

2. Select an op amp with sufficient bandwidth and slew rate.

3. Use precision resistors to reduce gain error.
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 theory, calculations, simulations
schematics, PCB files, bench test results

Analog Engineer’s Pocket Reference
www.TI.com/analogrefguide
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PCB, analog, mixed signal design formulae
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Evaluation module providing engineers with SC70, SOT23, SOIC packaging and 12 popular amplifier configurations

The Signal
www.TI.com/signalbook
PDF, iTunes app and hardcopy available
A compendium of blog posts on op amp design topics including offset voltage, input bias current, stability, noise and more

Analog Wire Blog
www.TI.com/analogwire
Technical blogs written by analog experts
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