1 Description

The DEM-OPA-SO-2E demonstration fixture is a generic, unpopulated printed circuit board (PCB) for high-speed dual operational amplifiers in an SO-8 package with a flow-through pinout. Figure 1 shows the package pinouts supported by this PCB. For more information on specific op amps, as well as good PCB layout techniques, see the individual amplifier data sheets.

Figure 1. SO-8 Package Pinout, Top View
2 Circuit

The circuit schematic in Figure 2 shows the connections for all possible components. Each configuration uses only some of the components.

![Circuit Diagram]

NOTE: The positive and negative power-supply connections to pins 6 and 7 of the DUT have been reversed erroneously. To rectify this error, reverse the power-supply connections to the terminal block, TB1. If using tantalum capacitors for C1 and C2, make sure that the polarity of the capacitors match the power-supply connections.

Figure 2. Schematic for DEM-OPA-SO-2E
3 Components

Components that have RF performance similar to the ones listed in Table 1 may be substituted. C₁ and C₂ need a larger voltage rating for ±15V dual supplies.

<table>
<thead>
<tr>
<th>PART</th>
<th>DESCRIPTION</th>
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</thead>
<tbody>
<tr>
<td>C₁, C₂</td>
<td>Tantalum Chip Capacitor, SMD EIA Size 3216, 20V</td>
</tr>
<tr>
<td>C₃</td>
<td>X2Y® capacitor, (Yageo X0603MRX7R6BB104)</td>
</tr>
<tr>
<td>C₄, C₅, C₆, C₇, C₈</td>
<td>Multilayer Ceramic Chip Capacitor, SMD 0402, 10V</td>
</tr>
<tr>
<td>In A, In B, In Diff, Out A, Out B, Out C</td>
<td>SMA or SMB Board Jack (Amphenol 901-144-8)</td>
</tr>
<tr>
<td>L₁, L₂</td>
<td>EMI-Suppression Ferrite Chip, SMD 0805 (Steward LI 0805 B 900 R)</td>
</tr>
<tr>
<td>TB₁</td>
<td>Terminal Block, 3.5mm Centers (On-Shore Technology ED555/3DS)</td>
</tr>
<tr>
<td>R₉ except R₁₀ and R₁₁</td>
<td>Metal Film Chip Resistor, SMD 0402, 1/16W</td>
</tr>
<tr>
<td>R₁₀, R₁₁</td>
<td>Metal Film Chip Resistor, SMD 0806, 1/8W</td>
</tr>
<tr>
<td>T₁, T₂, T₃, T₄</td>
<td>Transformer, (MA:COM ETC1-1-13)</td>
</tr>
</tbody>
</table>

For a single-ended configuration, R₁X, R₂X, R₃X, and R₄X are used for the signal path. For a differential configuration, R₉ through R₁₀ are used to set the input and output impedance conditions. C₁, C₂, and C₉ are supply bypass capacitors. L₁ and L₂ are ferrite chips that can reduce interactions with the power supply at high frequencies. If not desired, they can be replaced with 0Ω resistors.

For the differential configuration, a common dc voltage can be generated using R₁₀, R₁₁, and the bypass capacitor, C₉. The transformers T₃ and T₄ provide a path to calibrate the transformers out of the signal path, if necessary.

4 Board Layout

This demonstration fixture is a four-layer PCB. (See Figure 3.) It uses a ground plane located underneath the signal traces to provide 50Ω characteristic impedance transmission lines. The ground plane has been opened up around op amp pins sensitive to capacitive loading. Power-supply traces are laid out to keep current loop areas to a minimum. Power-supply traces are found on the two lower layers. The SMA (or SMB) connectors can be mounted as edge mount connectors.

The location and type of capacitors used for power-supply bypassing are crucial to high-frequency amplifiers. The tantalum capacitors, C₁ and C₂, do not need to be as close to pins 7 and 4 on the PCB, and may be shared with other amplifiers.

See the individual op amp data sheet for more information on proper PCB layout techniques and component selection.

5 Measurement Tips

This demonstration fixture, with the component values shown, is designed to operate in a 50Ω environment; most data sheet plots are obtained under these conditions. It is easy to change the component values for different input and output impedance levels. However, do not use high-impedance probes; they represent a heavy capacitive load to the op amp, and alter the amplifier response. Instead, use low-impedance (≤ 500Ω) probes with adequate bandwidth. The probe input capacitance and resistance set an upper limit on the measurement bandwidth. If a high-impedance probe must be used, place a 100Ω resistor on the probe tip to isolate its capacitance from the circuit.
Figure 3. DEM-OPA-SO-2E Demonstration Board Layout
**Revision History**

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

<table>
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<tr>
<th>Changes from Original (November 2008) to A Revision</th>
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<tr>
<td>• Added note to Figure 2 ..................................................</td>
<td>2</td>
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