DEM-OTA-SO-1A Demonstration Fixture

1 Description

The DEM-OTA-SO-1A demonstration fixture is a generic, unpopulated printed circuit board (PCB) for single operational transconductance amplifiers in SO-8 packages. Figure 1 shows the package pinout for this PCB. For more information on these op amps, as well as good PCB layout techniques, see the individual amplifier data sheets.

![Figure 1. SO Package Pinout, Top View](image1)

2 Circuit

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

![Figure 2. Schematic for DEM-OTA-SO-1A](image2)
3 Components

Components that have RF performance similar to the ones in Table 1 may be substituted.

<table>
<thead>
<tr>
<th>PART</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>C_{BP_U}, C_{BN_U}</td>
<td>Tantalum Chip Capacitor, SMD EIA Size 3528, 20V</td>
</tr>
<tr>
<td>C_{BP_N}, C_{BN_N}, C_C, C_E</td>
<td>Multilayer Ceramic Chip Capacitor, SMD 1206, 50V</td>
</tr>
<tr>
<td>OTA_IN, OTA_OUT, BUF_IN, BUF_OUT</td>
<td>SMA or SMB Board Jack (Amphenol 901-144-8)</td>
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<td>L_P, L_N</td>
<td>EMI-Suppression Ferrite Chip, SMD 1206 (Steward LI 1206 B 900 R)</td>
</tr>
<tr>
<td>TB</td>
<td>Terminal Block, 3.5mm Centers (On-Shore Technology ED555/3DS)</td>
</tr>
<tr>
<td>R_{XXX}</td>
<td>Metal Film Chip Resistor, SMD 1206, 1/8W</td>
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</tbody>
</table>

Please refer to Figure 3 for the location of the following components:

- \( R_{B2}, R_{C1}, \) and \( R_{C2} \) set the desired input/output impedances of the OTA section.
- \( R_{BIND}, R_{BOUT1}, \) and \( R_{BOUT2} \) set the desired input/output impedances of the buffer section.
- \( R_{B1}, \) and \( R_{B1} \) are used to form a band-limiting pole at high frequency with the parasitic input capacitance.
- Either \( R_{Q1} \) or \( R_{Q2} \) is used to set the quiescent current of the OTA section.
- \( R_E \) (used in conjunction with \( R_{C1} \) and \( R_{C2} \)) sets the gain.
- \( R_1, R_2, C_C, \) and \( C_E \) are used in application circuits. Please refer to the individual product data sheet when using these components.
4 Board Layout

This demonstration fixture is a four-layer PCB. It uses both a ground plane and power traces on the inner layers. The ground plane has been opened up around op amp pins that are sensitive to capacitive loading. Power-supply traces are laid out to keep current loop areas to a minimum. The SMA (or SMB) connectors may be mounted either vertically or horizontally onto the board edge. The location and type of capacitors used for power-supply bypassing are crucial for high-frequency amplifiers. The tantalum capacitors, $C_{BP,U}$ and $C_{BN,U}$, do not need to be close to pins 4 and 7 on the PCB and may be shared with other amplifiers. See the individual op amp data sheet for more information on proper board layout techniques and component selection.

Figure 3. DEM-OTA-SO-1A Demonstration Board Layout

(1) The board name appearing in the top silkscreen is DEM-OPA86xD with the Revision 3 design finalized in August 2004.
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 this way. 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 will 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.
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