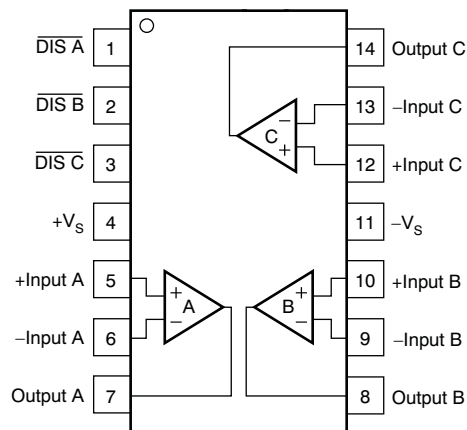


## DEM-OPA-SO-3B Demonstration Fixture

### 1 Description

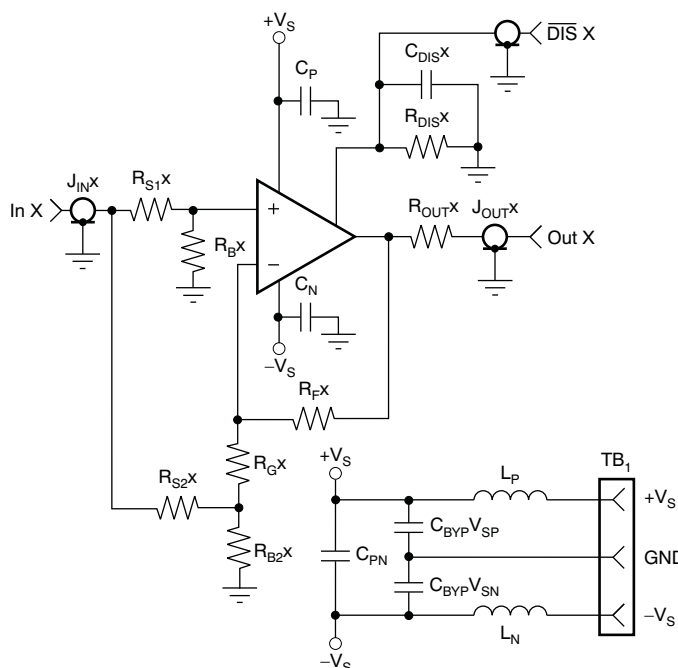
The DEM-OPA-SO-3B demonstration fixture is a generic, unpopulated printed circuit board (PCB) for triple operational amplifiers in SO-14 packages with missing quad pinout. [Figure 1](#) shows the package pinout supported by this PCB. For more information on specific op amps, as well as good PCB layout techniques, see the individual amplifier data sheets.



**Figure 1. SO-14 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.



**Figure 2. Schematic for DEM-OPA-SO-3B**

## 3 Components

Components that have RF performance similar to the ones listed in [Table 1](#) may be substituted.  $C_{BYPVSP}$  and  $C_{BYPVSN}$  need a larger voltage rating for  $\pm 15V$  dual supplies.

**Table 1. Component Descriptions**

PART	DESCRIPTION
$C_{BYPVSP}$ , $C_{BYPVSN}$	Tantalum Chip Capacitor, SMD EIA Size 3528, 20V
$C_N$ , $C_P$ , $C_{PN}$	Multilayer Ceramic Chip Capacitor, SMD 1206, 50V
$J_{INX}$ , $J_{OUTX}$	SMA or SMB Board Jack (Amphenol 901-144-8)
$L_P$ , $L_N$	EMI-Suppression Ferrite Chip, SMD 1206 (Steward LI 1206 B 900 R)
$TB_1$	Terminal Block, 3.5mm Centers (On-Shore Technology ED555/3DS)
$R_{xxx}$	Metal Film Chip Resistor, SMD 1206, 1/8W

$R_{B^X}$ ,  $R_{OUTX}$ , and  $R_{B2X}$  set the I/O impedance,  $R_{F^X}$  and  $R_{G^X}$  set the gain, and  $C_{BYPVSN}$ ,  $C_{BYPVSP}$ ,  $C_N$ ,  $C_P$ , and  $C_{PN}$  are supply bypass capacitors.  $C_{PN}$  is optional; it adds a bypass between the supplies that improves distortion performance for some models.  $L_P$  and  $L_N$  are ferrite chips that can reduce interactions with the power supply at high frequencies. If not desired, they can be replaced with  $0\Omega$  resistors.

For single-supply operation, do not connect  $L_N$ ; otherwise, the  $-V_S$  input to  $TB_1$  would be at ground potential.

**Op Amp with Standard SO-14 Pinout**—These op amps have the pinout shown in [Figure 3](#). [Table 2](#) shows typical values used for these parts. To select component values for a specific op amp (especially R<sub>F</sub>X), consult the respective data sheet.

**Table 2. Op Amp with Standard SO-14 Pinout<sup>(1)</sup>**

COMPONENT	DUAL-SUPPLY (G = +2)	DUAL-SUPPLY (G = -1)	SINGLE-SUPPLY (G = +1)
R <sub>B</sub> X	49.9Ω	10Ω	49.9Ω
R <sub>B2</sub> X	0Ω	53.6Ω	Open
R <sub>S1</sub> X	0Ω	Open	0Ω
R <sub>S2</sub> X	Open	0Ω	Open
R <sub>F</sub> X	800Ω	800Ω	1kΩ
R <sub>G</sub> X	800Ω	800Ω	Open
R <sub>OUT</sub> X	49.9Ω	49.9Ω	49.9Ω
C <sub>BYP</sub> V <sub>SP</sub>	2.2μF	2.2μF	2.2μF
C <sub>BYP</sub> V <sub>SN</sub>	2.2μF	2.2μF	Open
C <sub>N</sub>	0.1μF	0.1μF	0Ω
C <sub>P</sub>	0.1μF	0.1μF	0.1μF
C <sub>PN</sub>	0.1μF	0.1μF	Open
L <sub>P</sub>	0Ω	0Ω	0Ω
L <sub>N</sub>	0Ω	0Ω	Open

<sup>(1)</sup> The values and gains listed here will not work for all op amps. See the specific data sheet to select proper values. The I/O impedances are 50Ω.

## 4 Board Layout

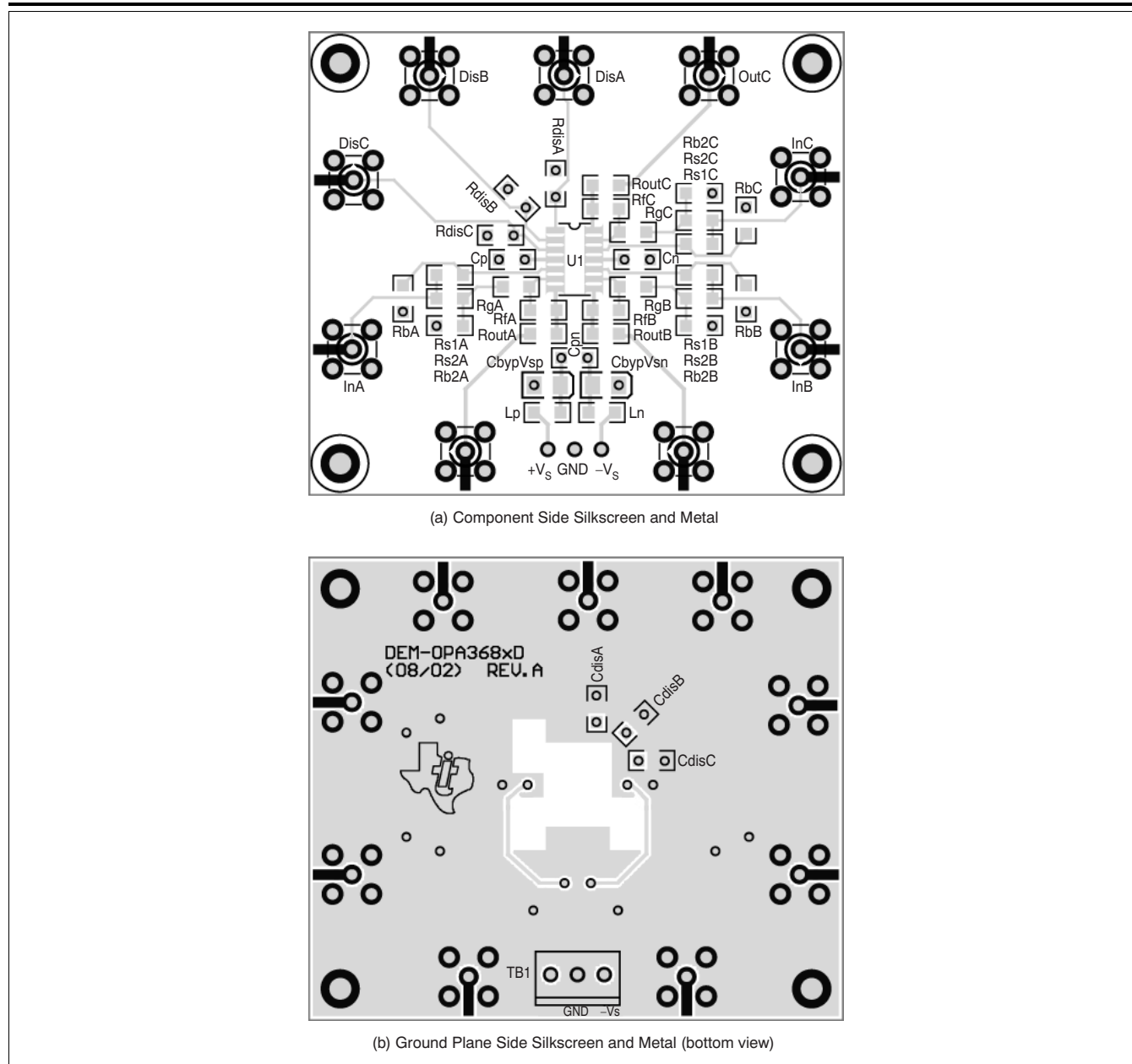
This demonstration fixture is a two-layer PCB. (See [Figure 3](#).) It uses a ground plane on the bottom, and signal and power traces on the top. The ground plane has been opened up around op amp pins sensitive to capacitive loading. Power-supply traces are laid out to keep current loop areas to a minimum. The SMA (or SMB) connectors may be mounted either vertically or horizontally.

The location and type of capacitors used for power-supply bypassing are crucial to high-frequency amplifiers. The tantalum capacitors, C<sub>BYP</sub>V<sub>SP</sub> and C<sub>BYP</sub>V<sub>SN</sub>, do not need to be as close to pins 11 and 4 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.

## 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 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.



- (1) The board name shown in the silkscreen is DEM-OPA368xD with the Burr-Brown Revision A design finalized in August 2002.

**Figure 3. DEM-OPA-SO-3B Demonstration Board Layout**

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