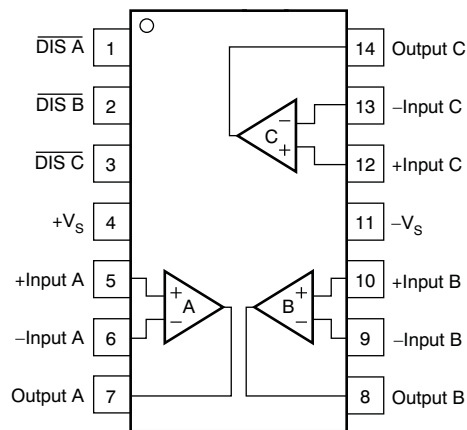


## **DEM-OPA-SO-3B Demonstration Fixture**

### **1 Description**

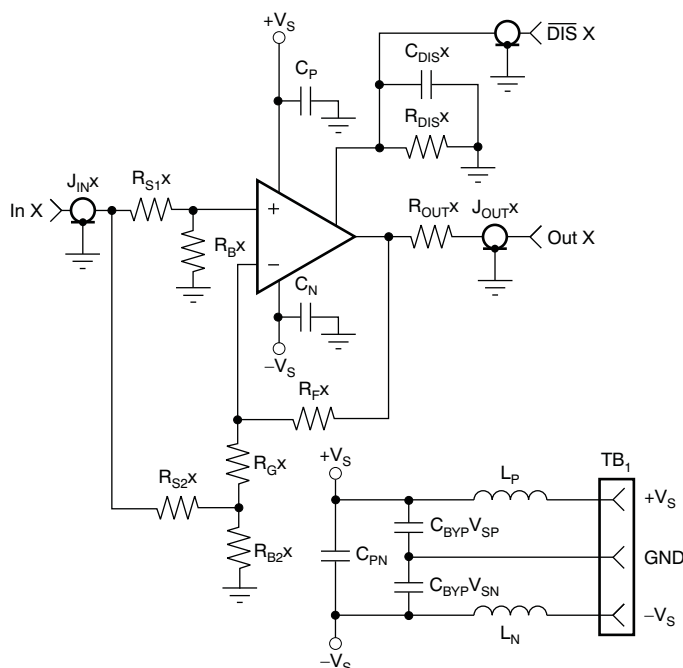
The DEM-OPA-SO-3B demonstration fixture is a generic, unpopulated printed circuit board (PCB) for triple operational amplifiers in SO-14 packages with missing quad pinout. [Figure 1](#) shows the package pinout supported by this PCB. For more information on specific op amps, as well as good PCB layout 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.  $C_{BYPV_{SP}}$  and  $C_{BYPV_{SN}}$  need a larger voltage rating for  $\pm 15V$  dual supplies.

**Table 1. Component Descriptions**

PART	DESCRIPTION
$C_{BYPV_{SP}}$ , $C_{BYPV_{SN}}$	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 <sub>1</sub>	Terminal Block, 3.5mm Centers (On-Shore Technology ED555/3DS)
Rxxx	Metal Film Chip Resistor, SMD 1206, 1/8W

$R_{BX}$ ,  $R_{OUTX}$ , and  $R_{B2X}$  set the I/O impedance,  $R_{FX}$  and  $R_{GX}$  set the gain, and  $C_{BYPV_{SN}}$ ,  $C_{BYPV_{SP}}$ ,  $C_N$ ,  $C_P$ , 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<sub>1</sub> 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  $R_{FX}$ ), 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)
$R_{BX}$	49.9 $\Omega$	10 $\Omega$	49.9 $\Omega$
$R_{B2X}$	0 $\Omega$	53.6 $\Omega$	Open
$R_{S1X}$	0 $\Omega$	Open	0 $\Omega$
$R_{S2X}$	Open	0 $\Omega$	Open
$R_{FX}$	800 $\Omega$	800 $\Omega$	1k $\Omega$
$R_{GX}$	800 $\Omega$	800 $\Omega$	Open
$R_{OUTX}$	49.9 $\Omega$	49.9 $\Omega$	49.9 $\Omega$
$C_{BYPV_{SP}}$	2.2 $\mu$ F	2.2 $\mu$ F	2.2 $\mu$ F
$C_{BYPV_{SN}}$	2.2 $\mu$ F	2.2 $\mu$ F	Open
$C_N$	0.1 $\mu$ F	0.1 $\mu$ F	0 $\Omega$
$C_P$	0.1 $\mu$ F	0.1 $\mu$ F	0.1 $\mu$ F
$C_{PN}$	0.1 $\mu$ F	0.1 $\mu$ F	Open
$L_P$	0 $\Omega$	0 $\Omega$	0 $\Omega$
$L_N$	0 $\Omega$	0 $\Omega$	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 50 $\Omega$ .

## 4 Board Layout

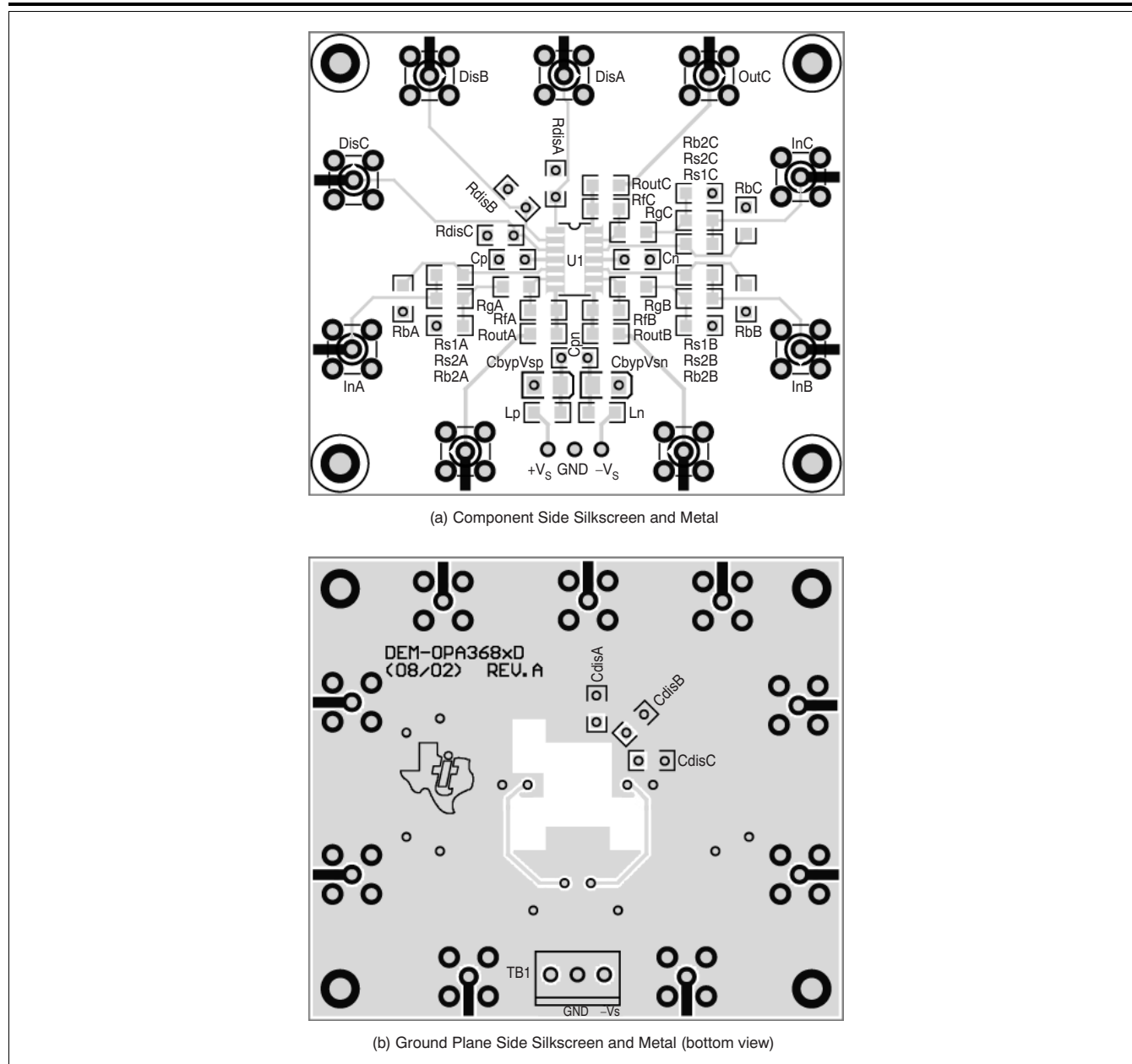
This demonstration fixture is a two-layer PCB. (See [Figure 3](#).) It uses a ground plane on the bottom, and signal and power traces on the top. The ground plane has been opened up around op amp pins sensitive to capacitive loading. Power-supply traces are laid out to keep current loop areas to a minimum. 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,  $C_{BYPV_{SP}}$  and  $C_{BYPV_{SN}}$ , 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 50 $\Omega$  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 ( $\leq 500\Omega$ ) 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 100 $\Omega$  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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