Evaluation Board for Differential Amplifiers Offered in 8-Lead MSOP Packages

FEATURES
- Flexible board layout for various circuit configurations
- Enables quick breadboarding/prototyping
- Edge mounted SMA connector provisions
- Easy connection to test equipment and other circuits
- RoHS compliant

GENERAL DESCRIPTION
The Analog Devices, Inc., DIFF AMP MSOP 8 PIN EVAL BD Z (EVAL-FDA-1RMZ-8) evaluation board evaluates single, high speed, fully differential amplifiers offered in 8-lead MSOP packages. The evaluation board is a bare board that enables users to quickly prototype a variety of amplifier circuits, minimizing risk and reducing time to market. The board layout is flexible and allows many circuit configurations, including traditional four resistor circuits, circuits with two different feedback loops, and filters. Most resistors and capacitors use 1206, 0402, 0508, and 0603 packages.

Because this universal evaluation board can be used with many Analog Devices differential amplifiers in 8-lead MSOP packages, the evaluation board label does not contain specific device numbers.

The board accommodates the ADA4940-1, as well as the AD8131, AD8132, and AD8138 differential amplifiers (see the Related Links section for all devices). The data sheets for these devices should be consulted in conjunction with this evaluation board user guide.

Figure 1 shows the component side of the bare evaluation board. Figure 2 shows the circuit side of the bare evaluation board.

Figure 3 shows the evaluation board schematic. The printed circuit board (PCB) assembly drawings are shown in Figure 4 and Figure 5. The layout pattern for the PCB is shown in Figure 6 and Figure 7.
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### REVISION HISTORY

3/16—Revision 0: Initial Version
EVALUATION BOARD HARDWARE

POWER SUPPLIES

Apply power to the evaluation board through the TVCC and TVEE test points (see Figure 3). The board accommodates single or dual supplies. For single-supply operation, connect the negative supply to the ground plane.

It is important that the power supply pins of the device under test (DUT) have broadband decoupling circuitry. The board layout facilitates the decoupling ability with footprints for 0508 ceramic capacitors (CVCC2 and CVEE2) on each supply, as well as 0402 ceramic capacitors (CVCC1 and CVEE1). Bulk decoupling is provided by CVCC3 and CVEE3; 10 µF tantalum capacitors are recommended.

FEEDBACK NETWORKS AND INPUT/OUTPUT TERMINATIONS

Resistors RGN and RFN comprise the negative resistive feedback loop and Resistors RGP and RFP comprise the positive feedback loop (see Figure 3). To minimize summing node capacitances, the ground plane under and around Pin 1 and Pin 8 of the DUT and the copper that connects to the pins are removed.

Resistors RTN and RTP are included as input termination resistors for applications that have single-ended inputs.

VOCM INPUT

An external voltage can be applied to the VOCM pin on the DUT via the TVOCM test point (referenced to the ground plane of the board). In analog-to-digital converter (ADC) driver applications, it is convenient to apply the ADC dc reference voltage output directly. The CVOM component position can be used for both resistors and capacitors. A 0.1 µF capacitor provides bypassing for the dc voltage applied to the VOCM pin in normal applications.

It is also possible to drive the VOCM input from an external ac source. In this case, omit CVOM or reduce it to a value that allows the desired signal to pass.

COMMON-MODE VOLTAGE

The internal common-mode feedback loop, used in the differential drivers, forces the output common-mode voltage to equal the voltage applied to the VOCM input, thereby providing excellent output balance.

SMA INPUT/OUTPUT CONNECTORS

The inputs and outputs have edge mounted SMA connectors for a convenient connection to coaxial cables. The recommended connector is 142-0701-801 from Johnson Components, or an equivalent.
Figure 3. Differential Amplifier Evaluation Board Schematic, 8-Lead MSOP
### ORDERING INFORMATION

**BILL OF MATERIALS**

Table 1.

<table>
<thead>
<tr>
<th>Qty</th>
<th>Reference Designator</th>
<th>Description</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>CVCC3, CVEE3, CD3</td>
<td>Capacitor, 10 µF</td>
<td>C1206</td>
</tr>
<tr>
<td>3</td>
<td>CVCC2, CVEE2, CD2</td>
<td>Capacitor, 0.1 µF</td>
<td>C0508</td>
</tr>
<tr>
<td>3</td>
<td>CVCC1, CVEE1, CD1</td>
<td>Capacitor, 0.1 µF</td>
<td>C0402</td>
</tr>
<tr>
<td>2</td>
<td>CPD, CVOM</td>
<td>Capacitor or resistor</td>
<td>C0402</td>
</tr>
<tr>
<td>4</td>
<td>−IN, +IN, −OUT, +OUT</td>
<td>Side launch SMA connector</td>
<td>SMA/SMT</td>
</tr>
<tr>
<td>4</td>
<td>VCC, VEE, VOCM, PD</td>
<td>Vertical launch SMA connector</td>
<td>SMA/SMT</td>
</tr>
<tr>
<td>10</td>
<td>RTN, RTP, RGP, RGN, RFP, RFN, ROP1, ROP2, RON1, RON2</td>
<td>Resistor, user defined value</td>
<td>R0603</td>
</tr>
<tr>
<td>8</td>
<td>TVCC, TVEE, TVOCM, TPD, GND1 to GND4</td>
<td>Test point</td>
<td>TP1</td>
</tr>
<tr>
<td>1</td>
<td>DUT</td>
<td>Device under test</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>PCB</td>
<td>Printed circuit board</td>
<td>8-lead SOIC</td>
</tr>
</tbody>
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### RELATED LINKS

Table 2.

<table>
<thead>
<tr>
<th>Resource</th>
<th>Description</th>
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<tbody>
<tr>
<td>ADA4940-1</td>
<td>Product page, ultralow power, low distortion differential ADC driver</td>
</tr>
<tr>
<td>AD8131</td>
<td>Product page, low cost, high speed differential driver with a fixed gain of 2</td>
</tr>
<tr>
<td>AD8132</td>
<td>Product page, low cost, high speed differential amplifier</td>
</tr>
<tr>
<td>AD8137</td>
<td>Product page, low cost, high speed differential ADC driver</td>
</tr>
<tr>
<td>AD8138</td>
<td>Product page, low distortion differential ADC driver</td>
</tr>
<tr>
<td>AD8139</td>
<td>Product page, ultralow noise, rail-to-rail differential ADC driver</td>
</tr>
</tbody>
</table>

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

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