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Low-Cost, High-Speed Differential Amplifier

AD8132 Evaluation Board

The AD8132 Evaluation Board is designed to allow versatile exploration of the capabilities of the part in various circuit configurations. As such, it is supplied in a standard configuration, but it has various component positions that are not populated which can be used for experimentation and measurement.

Power Supplies

P1 is used for a power supply connector. It is a 3-pin Molex type. Alternatively, the loop-type test points can be used to connect power to the board.

The AD8132 is well bypassed by several values of capacitors that are very close to the device. Please refer to the AD8132 Evaluation Board Schematic.

The nominal supply voltage for the part is +/-5V. However, it can be run from a single supply of from +3V to +10V by connecting V- to ground. The AD8132 will draw about 12 mA of supply current. However, the overall supply current will be increased by the current in R1, which is (V+ - V-) / 1k.

Differential Feedback Components

The board is delivered configured as a single-ended to differential converter with a gain of two. The single-ended input can be applied to J3. For terminating a 50-ohm cable, a 49.9 ohm resistor has been installed to ground at R6.

The feedback resistors, R19 and R20 are 1k and the gain resistors R17 and R18 are 499 ohms, 1%, to yield a gain of two. Shunt capacitor positions are provided for all of these resistors to aid in the creation of frequency-shaping circuits.

The most sensitive AD8132 nodes are the positive and negative inputs. The inner and surface layer planes have been removed from the area around these nodes. Also, components that connect to these nodes are located to minimize the overall size of the traces of these nodes.

There is a 24.9 ohm resistor in position R4. This terminates the negative input side of the AD8132 to ground. When the positive input is driven from a 50 ohm source that is terminated with 50 ohms, it looks like 25 ohms. The value of R4 is used to match this value.

The differential outputs appear on connectors J1 and J2. There is a 49.9 ohm resistor (R15 and R16) in series with each output. This would be the desired series termination resistor when driving a 100-ohm balanced cable.

Vocm Input

The board is designed so that the dc level of the output common-mode voltage can be adjusted via potentiometer R1. The wiper of R1 is bypassed via C9, a 0.1 uF capacitor. When tested, R1 was adjusted to set Vocm = 0, with +/-5V supplies. If the board is run from a single supply, then Vocm will be set to Vsupply/2.

If it is desired to have the output common –mode voltage always at ground, then R1 can be removed and C9 can be shorted. This will ground Vocm and force the output common-mode voltage to zero.

To supply a signal to Vocm from a signal generator, it can be connected to TP4. In this case, R1 and C9 should be removed. A termination resistor can be inserted in C9 if one is needed. TP4 can also be used to measure the voltage applied to Vocm.

Vocm can also be driven by an A/D reference output. In this configuration, R1 should be removed, and the reference can be connected to TP4. C9 can be used for bypassing.

Measuring the Output Common Mode

The AD8132 uses common-mode feedback to minimize the amount of common mode signal in its differential output. The circuit for measuring

the common mode voltage is provided in TPC 17 of the data sheet.

On the AD8132 evaluation board, providing equal value resistors at R11 and R12 creates the output voltage divider. TP1, which accepts a Berg / Specialty 33JR135-1 test point or equivalent, can be used for measuring the common-mode signal. This type of test point is recommended, because it has a ground shell that minimizes the inductance of the scope probe ground lead. These test points are compatible with many types of Tektronix passive and active probes.

For accurate output common-mode voltage measurement, R11 and R12 should match to better than the accuracy of the measurement. If the resistor match is 1%, then the best measurement accuracy will only be 40 dB down from the output signal amplitude. A .1% match will provide 60 dB of accuracy.

Measuring the Output Differential Mode- Using Transformers

Most high frequency test equipment provides only single-ended inputs and outputs. A simple way to convert between single-ended and differential signals is with the use of transformers. The differential side is center-tapped, while the single-ended side has one end connected to ground. The AD8132 has transformer options at both the input and output to aid in interfacing to single-ended test equipment.

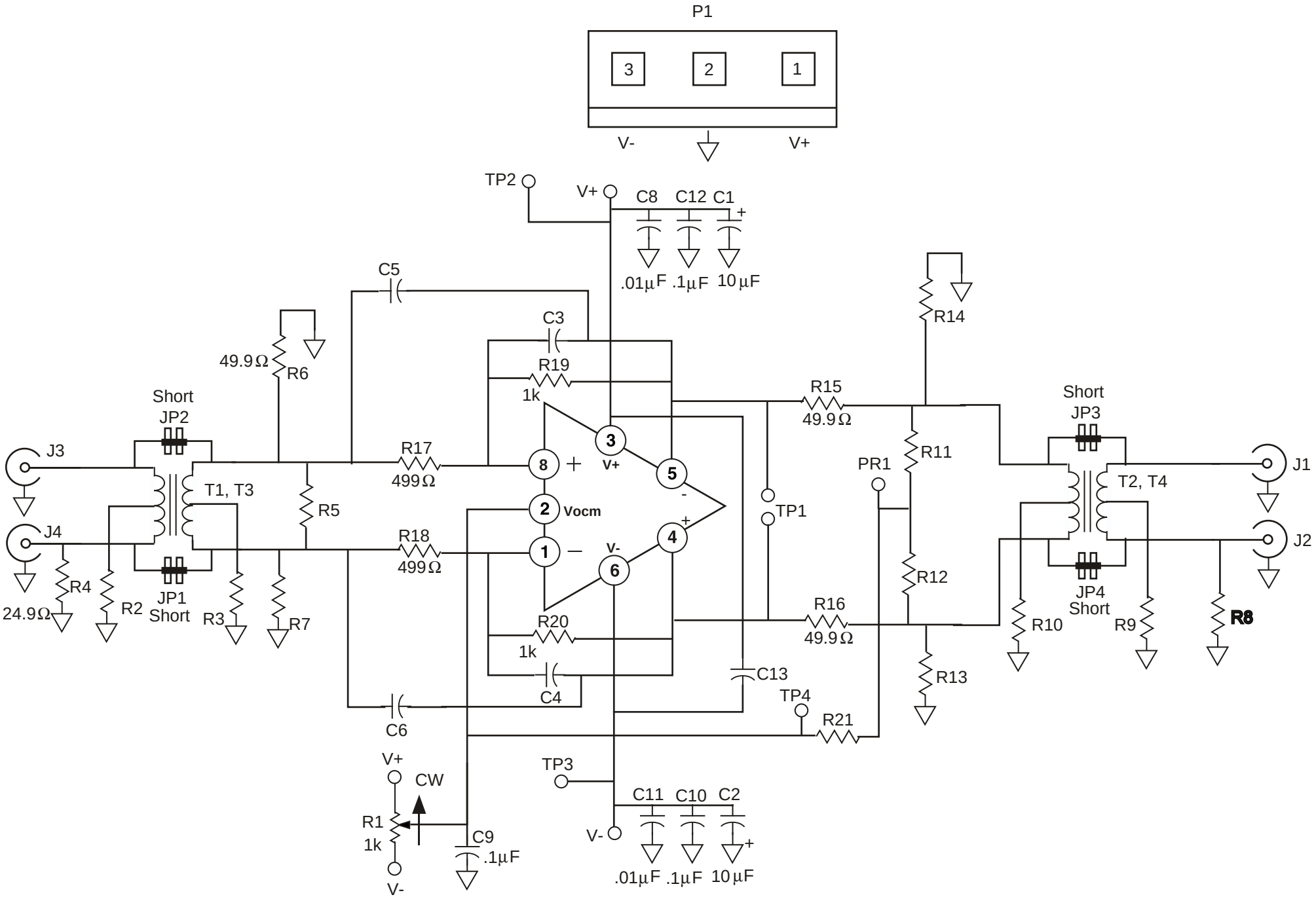
There are dual footprints for transformers on the input side (T1 and T3) and also the output side (T2 and T4). These are designed to accept Mini-Circuits KK81- (outer and larger footprint) or AT224- (inner footprint) size transformers. These transformers are not required for many circuits and the footprints are provided for test purposes.

When using transformers in the circuit, the primary-to-secondary short circuits must be opened. These are found on the opposite side of the board from the transformers at JP1 and JP2 on the input side and JP3 and JP4 on the output side. This type of shorting means was chosen to minimize parasitics.

Other Components

There are various other component locations on the AD8132 board that can be used for experimental or special-measurement purposes. Most of these are for 1206-size chip components. Some of these circuits include filters and other frequency-shaping circuits, like equalizers. The user is invited to experiment with creative circuits that can be constructed with this part.

Although the schematic might call for a capacitor or resistor at any given location, either component (or even an inductor) can be used at either location, depending on the circuit desired. If it is essential to minimize parasitics for a circuit, unused pads for optional components can cut from the board.



AD8132 Evaluation Board Schematic

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