

## LMH730276 4:1 Multiplexer Evaluation Board

### General Description

The LMH™730276 evaluation board is designed to aid in the characterization of National Semiconductor's High Speed 4:1 Multiplexers.

Use the evaluation board as a guide for high frequency layout and as a tool to aid in device testing and characterization.

The evaluation board schematic is shown in *Figure 1*. Refer to the product data sheets for recommendations for component values.

### Basic Operation

By changing  $R_{IN}$  ( $R1 - R4$ ) and  $R_{OUT}$  ( $R_O$ ) different input and output impedances can be matched. The SMA connectors and board traces are optimized for 50 to 75 $\Omega$  operation. Other impedances can be matched but performance may be noticeably different, especially high frequency response. Even with optimal layout, board parasitics play a large part in high frequency performance and different termination resistors will change the frequency of the dominant parasitic poles/zeros. To accommodate 50 $\Omega$  high speed pulse generators, termination resistors  $R6$ ,  $R7$ ,  $R8$  &  $R9$  are provided for the Address and Shutdown pins. When driving the logic pins be careful to use compatible signal levels. See the device datasheet for more details

### Layout Considerations

Printed circuit board layout and supply bypassing play major roles in determining high frequency performance. When designing your own board use the LMH730276 evaluation board as a guide and follow these steps to optimize high frequency performance

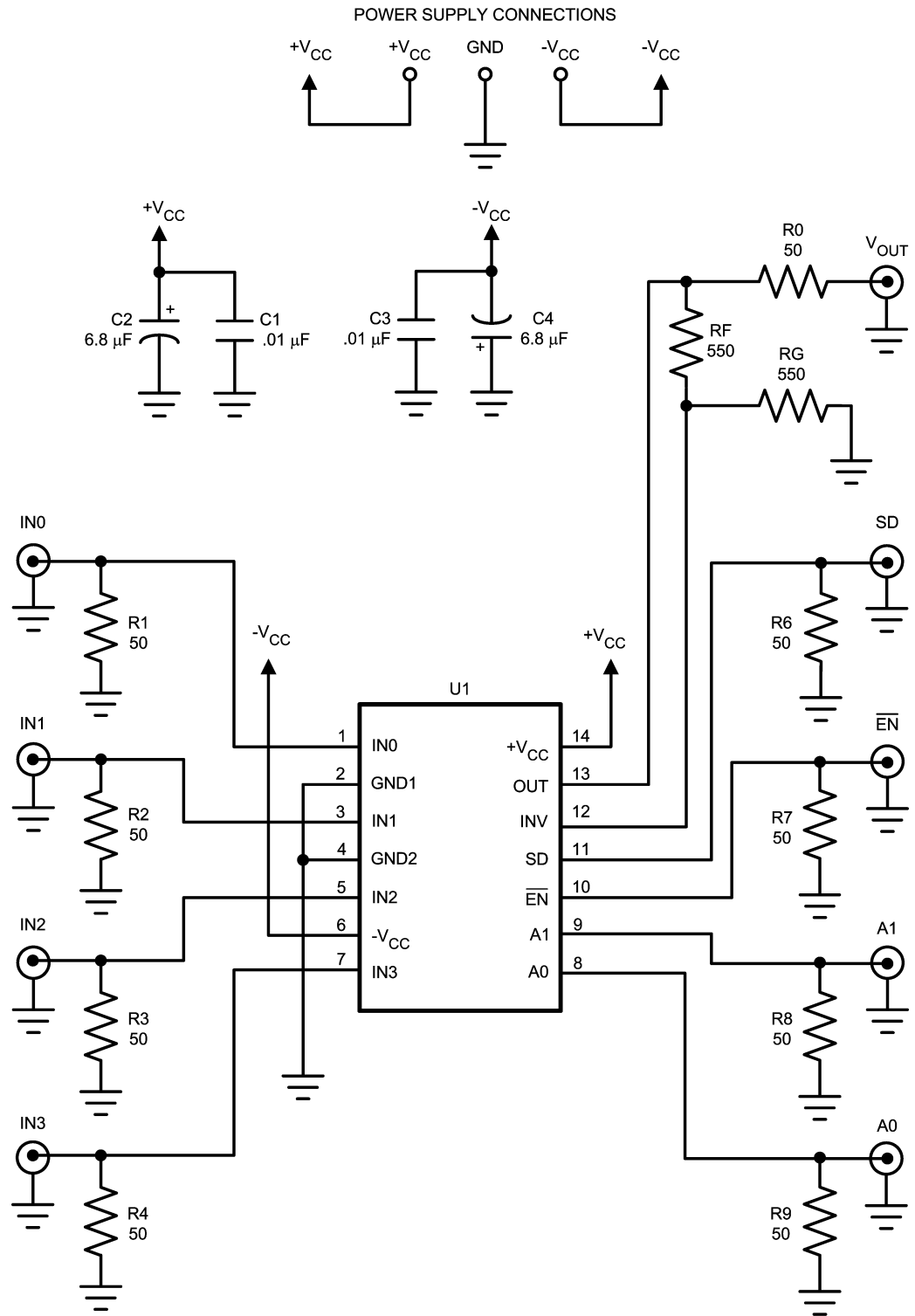
1. Use a ground plane.
2. Include large ( $\sim 6.8 \mu F$ ) capacitors on both supplies ( $C_2$  &  $C_4$ ).
3. Near the device use .01  $\mu F$  ceramic capacitors from both supplies to ground ( $C_1$ ,  $C_3$ ).
4. A capacitor between  $V^+$  and  $V^-$  is optional (to help suppress second order harmonic distortion; not included on evaluation board).
5. Remove the ground and power planes from under and around the part, especially near the OUT and INV pins.
6. Minimize all trace lengths.
7. Use terminated transmission lines for long traces.

Sample artwork for the LMH730276 Evaluation board is included on the next page in *Figure 2*.

### Measurement Hints

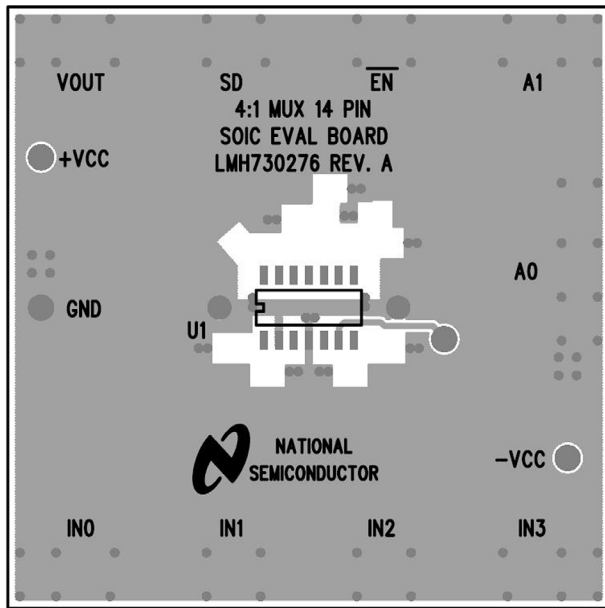
The board is designed for 50 $\Omega$  input and output connections into coaxial cables. For other impedances the terminating resistors can be modified to help match different impedances.

Do not use normal oscilloscope probes to test these circuits. The capacitive loading will change circuit performance drastically. Instead use low impedance resistive divider probes of 100 to 500 $\Omega$ . See *Figure 3* for a sample resistive probe. The Low impedance resistor should be 50 - 450 $\Omega$ . The ground connection should be as short as possible ( $\sim 1/2"$ ). Even with careful use of these probes, results should be considered preliminary until verified with controlled impedance measurements. Even the best probes will interfere with circuit operation to some degree. Also, tools, power cables, fingers, etc. near the device will change measurement results, often dramatically.

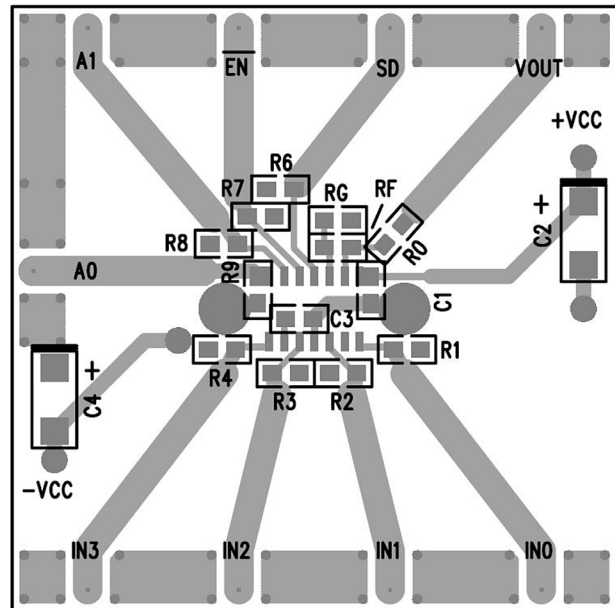


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FIGURE 1. Board Schematic

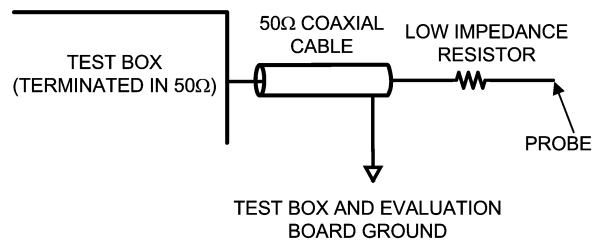


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FIGURE 2. Board Layout (Actual Size = 2" x 2")



$$\text{PROBE ATTENUATION} = \frac{50}{R + 50}$$

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FIGURE 3. Probe Schematic

## Notes

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**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

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