

Layout Recommendations for the AD9388A / ADV7441A

ATV- Applications

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PCB Layout Recommendations

The ADV7441A is a high-precision, high-speed mixed signal device. It is important to have a well laid-out PCB board, in order to achieve the maximum performance from the part. The following sections are a guide for designing a board using the ADV7441A.

Analogue Interface Inputs

It is extremely important to use the following layout techniques on the graphics inputs.

The trace length running into the graphics inputs should be minimized, and their lengths should be matched. This is accomplished by placing the ADV7441A as close as possible to the graphics VGA connector. Long input trace lengths are undesirable because they pick up more noise from the board and other external sources.

If using a voltage divider / termination resistors they should be placed as close as possible to the ADV7441A chip. Any additional trace length between the voltage divider / termination resistors and the input of the ADV7441A increases the magnitude of reflections, which corrupts the graphics signal. 75 ohm matched impedance traces should be used. Trace impedances other than 75 ohms also increase the chance of reflections.

The ADV7441A has high input bandwidth. While this is desirable for acquiring a high resolution PC graphics signal with fast edges, it means that it also captures any high frequency noise present. Therefore, it is important to reduce the amount of noise that gets coupled to the inputs. The user should avoid running any digital traces near the analog inputs.

Due to the high bandwidth of the ADV7441A, sometimes low-pass filtering the analog inputs can help to reduce noise. (For many applications, filtering is unnecessary.) Experiments have shown that placing a series ferrite bead prior to the voltage divider / termination resistor is helpful in filtering out excess noise. Specifically, the part used was the # 2508051217Z0 from Fair-Rite, but each application may work best with a different bead value.

Power Supply Bypassing

It is recommended to bypass each power supply pin with a 100nF and a 10nF capacitor. The fundamental idea is to have a bypass capacitor within about 0.5 cm of each power pin. Also, the user should avoid placing the capacitor on the opposite side of the PC board from the ADV7441A, as that interposes resistive vias in the path.

The bypass capacitors should be physically located between the power plane and the power pin. Current should flow from the power plane => capacitor => power pin. The power connection should not be made between the capacitor and the power pin. Generally, the best approach is to place a via underneath the 100nF capacitor pads down to the power plane.

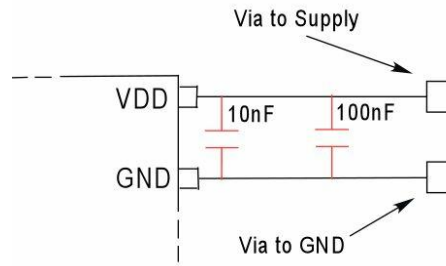


Figure 1 Recommended Power Supply Decoupling

It is particularly important to maintain low noise and good stability of PVDD (the clock generator supply). Abrupt changes in PVDD can result in similarly abrupt changes in sampling clock phase and frequency. This can be avoided by careful attention to regulation, filtering, and bypassing. It is highly desirable to provide separate regulated supplies for each of the analog circuitry groups.

Ground Layout

It is recommended to use a single ground plane with isolation trench for the board (see [Figure 2](#)). The green meandering line represents this ground plane split. Video Analog inputs are isolated to the left, while a digital crystal (top) and two HDMI connectors (bottom) are isolated to the right. Using multiple ground planes can be detrimental because each separate ground plane is smaller and long ground loops can result.

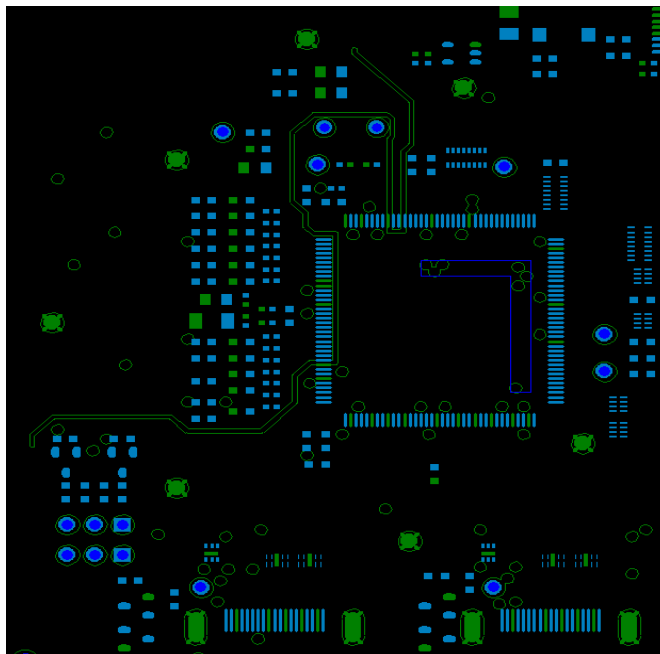


Figure 2: Recommended PCB Ground Layout

In some cases, using separate ground planes is unavoidable. For those cases, it is recommended to place, at least, a single ground plane under the ADV7441A. The location of the split should be under the ADV7441A. For this case it is even more important to place components wisely because the current loops will be much longer, (current takes the path of least resistance).