CASCADE® MICROTECH

Reduced Footprint Bypass Capacitor on Pyramid Probe® Thin Film

Abstract

Shrinking geometries and increasing performance requirements are driving the need for testing with reduced parasitics and cleaner power supplies. One of the unique features of Pyramid Probes is the ability to place components on the thin film closer to the DUT than with other probe technologies. This tech brief describes the reduced footprint structure to attach bypass caps (or any shunt component).

Introduction

There are two ways to attach a bypass cap to a power trace on the thin film of a Pyramid Probe. The original structure is intuitive when viewed in the 2-D drawing used for design review. Cascade Microtech designed a structure that uses a smaller total footprint by putting the component on top of the trace. It is not intuitive in the 2-D drawing used for design review. This technical brief shows the reduced footprint structure in 3-D to better describe the signal path and ground connection.

Pyramid Probe Thin Film

As shown in Figure 1, a Pyramid Probe thin film contains two metal layers. The signal plane is closer to the DUT and represented by red in the PDF file used for review. The ground plane is farther from the DUT and represented as blue. The ground plane is primarily a mesh. It is make solid where needed. The layers are shown as translucent in the PDF files. When power and ground overlap, they are represented as gray.

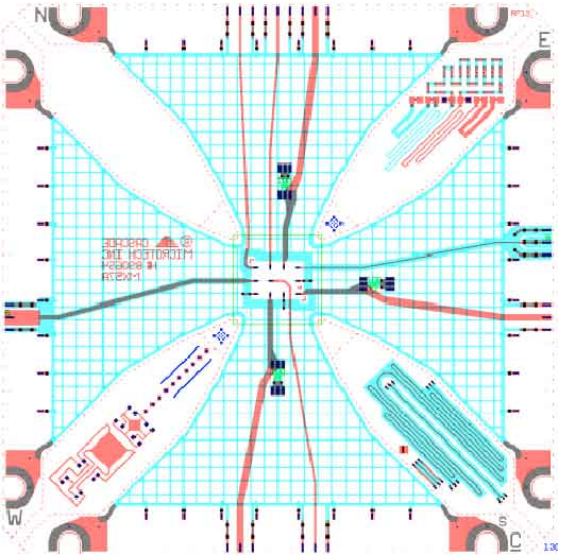
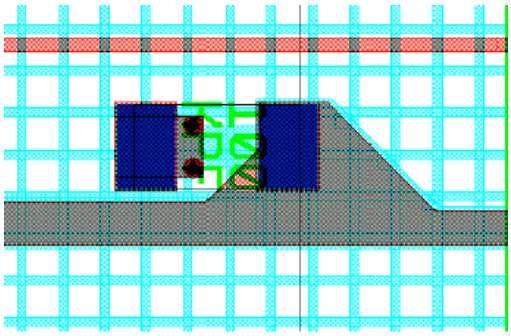


Figure 1. Example of simple design, with three power supplies, three bias lines, a 50 ohm transmission line on the right, and a 20 ohm transmission line on the left.

Bypass Cap Footprint

Traditionally and when space is not at a premium, the component attach pads and vias are adjacent to the power supply trace for a bypass capacitor as shown in Figure 2.

Figure 2. Normal bypass capacitor structure and a low speed bias line. The component is adjacent to the power supply trace.



Reduced Footprint

To better use limited real estate, a reduced footprint bypass capacitor structure is used. As shown in figure 3, the component sits directly above the power trace.

Figure 3. Power supply with the reduced footprint bypass cap layout and an adjacent low speed bias line.

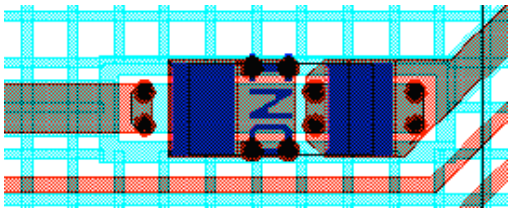
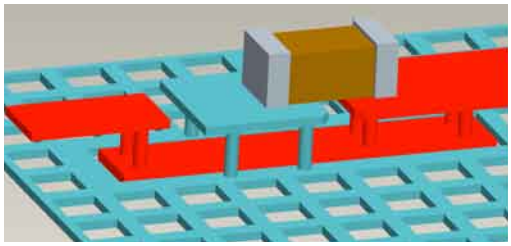


Figure 4 shows a 3-D drawing of the reduced footprint structure for bypass capacitors. The left end of the capacitor is connected to a wide section that is connected to GND with vias. The right end of the capacitor is connected to the supply trace. Using vias to an isolated section of the ground plane, the supply continues under the capacitor, between the ground vias, and then resumes its normal routing.

Figure 4. A 3-D representation of the reduced footprint structure for bypass caps on the thin film. The red features highlight the power supply's path.



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