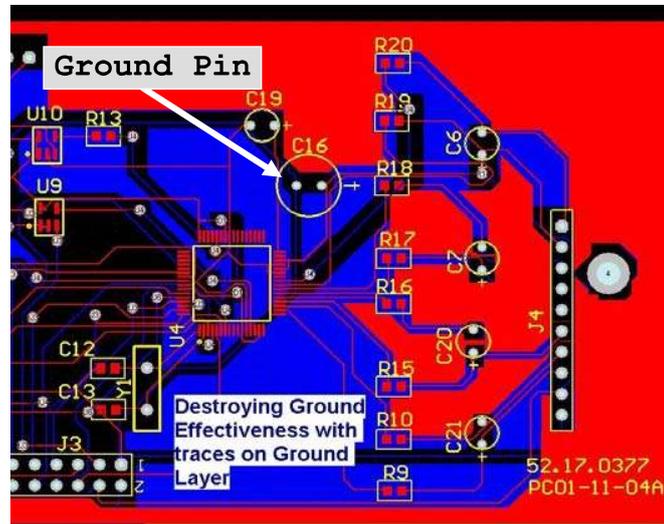


Precision Analog Applications Seminar

PCB Layout Tips

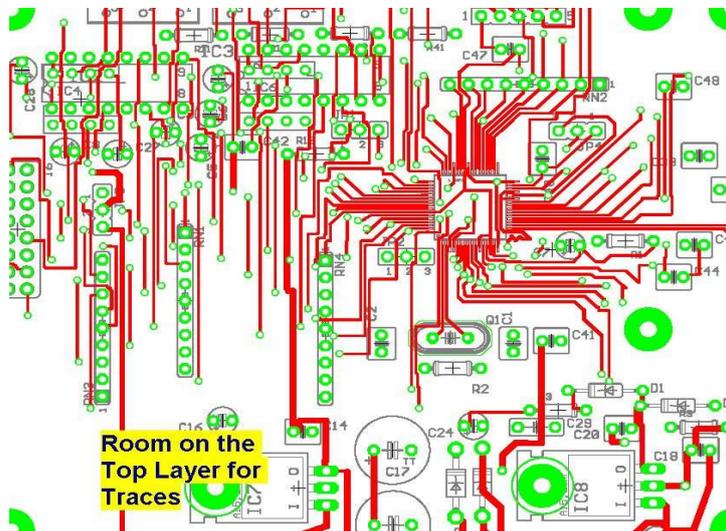
Layout Review #5



Here we see serious splits in the bottom ground plane. A close examination will also show that the traces that are splitting the ground plane are actually also ground signals.

Precision Analog Applications Seminar

PCB Layout Tips Layout Review #6-Top

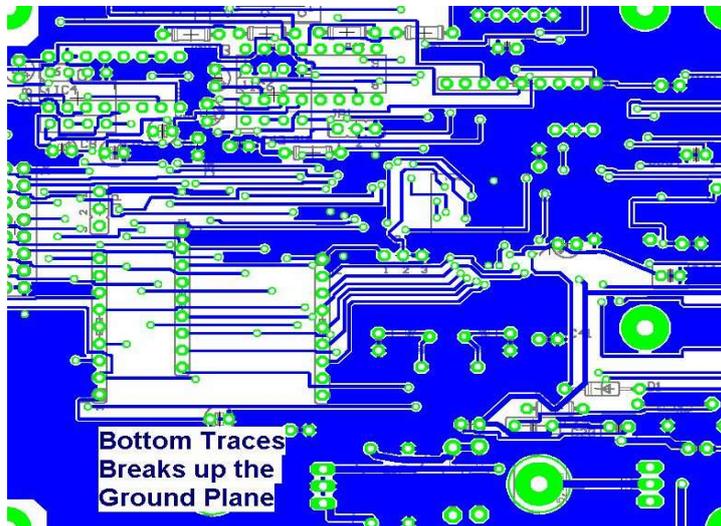


As this layer is compared with the next slide, it is evident that some of the traces could have been put on this layer so that the ground layer could have been more solid.

Precision Analog Applications Seminar

PCB Layout Tips

Layout Review #6 — Bottom

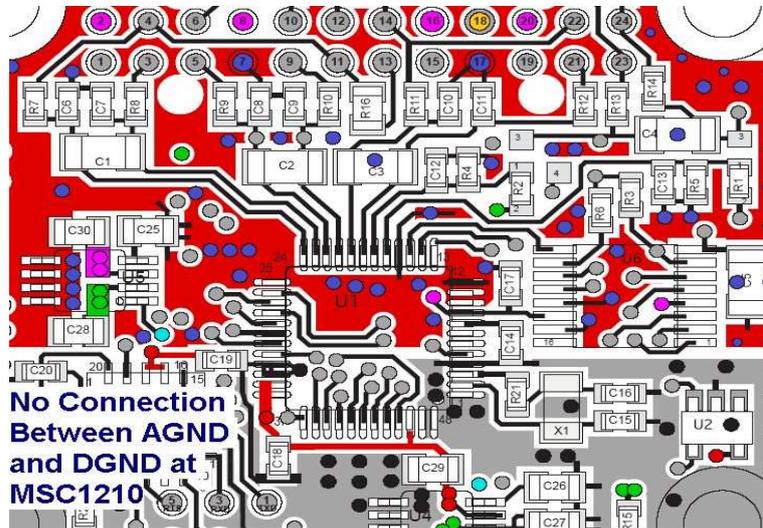


This shows the problem of using a digital PCB layout for an analog board. It simplifies the routing for most of the traces on each layer to go one direction, but that might lead to inefficiencies in the ground return currents and an unnecessary increase in inductance. Remember, inductance is defined by the size of the loop for the current.

Precision Analog Applications Seminar

PCB Layout Tips

Layout Review #7



There is a good separation between the analog and digital sections, but the AGND and DGND should be connected together at the ADC.

Precision Analog Applications Seminar

PCB Layout Tips

Forgotten Feedthrough

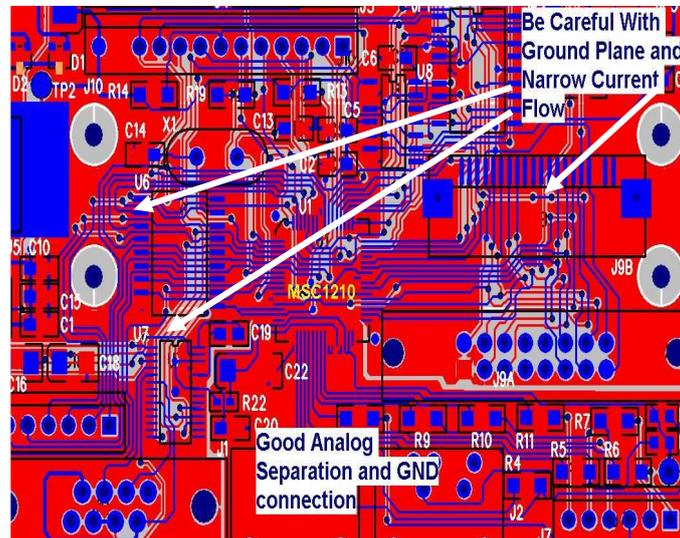


The goal was to place the resistor to protect the reset pin. The close placement of the resistor didn't solve the problem. However the feedthrough was to an external connector that defeated the purpose of the resistor.

Precision Analog Applications Seminar

PCB Layout Tips

Layout Review #8

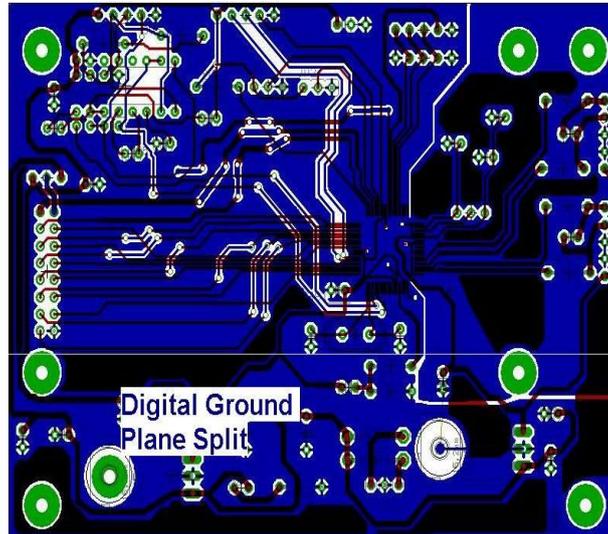


The Analog and Digital sections are nicely separated. The AGND and DGND are connected with a wide connection right at the MSC1210. But the ground plane sometimes has narrow channels for current which will increase inductance and noise. The return currents for the digital signals will want to travel under the horizontal traces, but the channels in the ground plane are generally vertical.

Precision Analog Applications Seminar

PCB Layout Tips

Layout Review #9 — Before

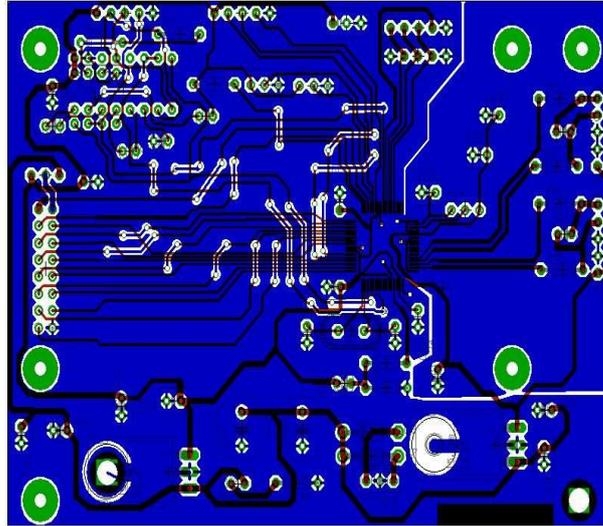


Analog and Digital sections separated with ground planes on both the bottom and the top. But the bottom ground plane is seriously split so that the ground return currents can't flow close to the source signal wires.

Precision Analog Applications Seminar

PCB Layout Tips

Cleaned Up Layout #9 — After



A few simple changes in the routing were able to provide a much better ground return path. Larger continuous areas of ground plane translate into short return current paths and lower inductance.

Precision Analog Applications Seminar

PCB Layout Tips

Summary

- ◆ **LSB size**
 - Higher resolution systems reveal PCB layout errors more clearly!
- ◆ **Basic PCB Design Principles**
 - Separate analog and digital signals
 - Establish good grounding
 - Minimize inductance
 - Control thermocouples
- ◆ **PCB Layout Reviews**
 - Learn from your mistakes!

Precision Analog Applications Seminar