# Noise Reduction

## Stack-up:

A very simple way you could start reducing noise is by choosing the right configuration for your board. A SIG/GND/GND/SIG configuration for example will tremendously decrease crosstalk between components on different signal layers but leaves the PCB susceptible to external EMI. On the other hand, GND/SIG/SIG/GND provides excellent protection against external EMI but causes a crosstalk issue between components on the inner layer, so pick and choose the best configuration for your design.

## Filtering:

One of the techniques you could use to eliminate noise in your design is to use active filters between components (ex; applying a band pass filter between a driver and a receiver). However, filtering can only be used to reduce noise in analog traces and shouldn't be used for digital applications as digital signals operate at a range of frequencies and the attenuation caused by filters will mess with the signal leading to incorrect readings by the receiver.

## Shielding:

Shielding is essentially blocking noise being emitted from a specific component rather than protecting a specific component from noise

One such technique that can be used in digital signals is enveloping a component in a metal case that will absorb all and any noise being

emitted by that component. This approach however if not applied appropriately will lead to ground loops generated through the metal case.

Coplanar waveguides can also be used as shielding; apply two grounded copper pours around the trace you wish to shield and use stitching vias correctly spaced out along the trace, blocking any noise that could be emitted from the trace.

## Isolation:

Isolation refers to splitting up ground planes to manipulate return paths of different components preventing them from interfering with each other. This technique while useful for noise prevention, has other alternative such as simply moving the components further apart or using stitching vias to pull the return current closer. In short, it should only be used if all else fails or if you can be sure that your design wont be negatively affected by splitting ground.