

due to the thinning of the atmosphere at high altitudes. Conformal coating also improves these figures for a given clearance, and this is often used on military spec PCBs.

Clearances for Electrical Conductors			
Voltage (DC or Peak AC)	Internal	External (<3050m)	External (>3050m)
0-15V	0.05mm	0.1mm	0.1mm
16-30V	0.05mm	0.1mm	0.1mm
31-50V	0.1mm	0.6mm	0.6mm
51-100V	0.1mm	0.6mm	1.5mm
101-150V	0.2mm	0.6mm	3.2mm
151-170V	0.2mm	1.25mm	3.2mm
171-250V	0.2mm	1.25mm	6.4mm
251-300V	0.2mm	1.25mm	12.5mm
301-500V	0.25mm	2.5mm	12.5mm

Component Placement & Design

An old saying is that PCB design is 90% placement and 10% routing. Whilst the actual figures are of no importance, the concept that component placement is by far the most important aspect of laying out a board certainly holds true. Good component placement will make your layout job easier and give the best electrical performance. Bad component placement can turn your routing job into a nightmare and give poor electrical performance. It may even make your board unmanufacturable. So there is a lot to think about when placing components!

Every designer will have their own method of placing components, and if you gave the same circuit (no matter how simple) to 100 different experienced designers you'd get a 100 different PCB layouts every time. So there is no absolute right way to place your components. But there are quite a few basic rules which will help ease your routing, give you the best electrical performance, and simplify large and complex designs.

At this point it is a good idea to give you an idea of the basic steps required to go about laying out a complete board:

- Set your snap grid, visible grid, and default track/pad sizes.
- Throw down all the components onto the board.
- Divide and place your components into functional "building blocks" where possible.
- Identify layout critical tracks on your circuit and route them first.
- Place and route each building block separately, off the board.
- Move completed building blocks into position on your main board.
- Route the remaining signal and power connections between blocks.
- Do a general "tidy up" of the board.
- Do a Design Rule Check.
- Get someone to check it

This is by no means a be-all and end-all check list, it's highly variable depending on many factors. But it is a good general guide to producing a professional first-class layout.

Lets look in more detail at the procedure described above.