



Advanced Topics

A sampling



Thermal Management

When things get hot they expand and contract and can break

- Connections within board itself
- Connections to parts on board

Bigger traces, planes are better for this

Heat sinks can also come in handy

Make sure mechanical design provides air flow

Keep an eye on thermal relief for plans; useful for soldering, bad for sinking heat





Impedance Control

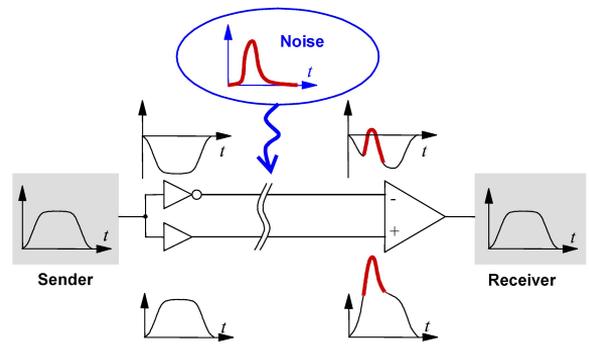
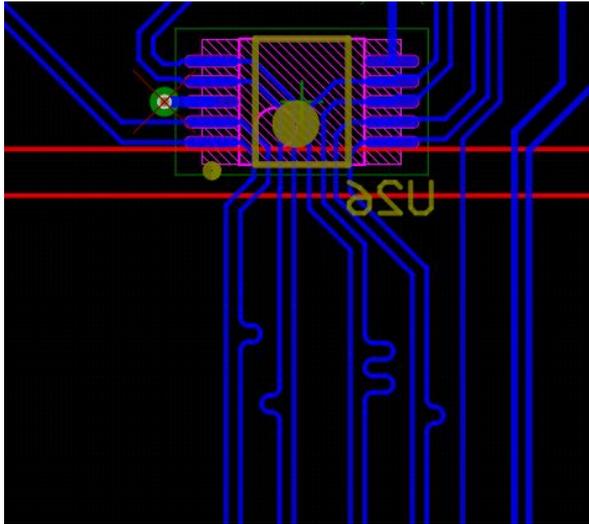
For high speed signals, must match impedance at junctions (like connectors)

- Else will cause reflections
- Improves signal integrity

Manufacturer will given impedance calculator for trace width, spacing

Often paired signals called differential pairs, protects against EMI by taking difference of signals rather than absolute value, improves noise

- Must length tune as well so signals are timed equally





Stackup Management

Where to put ground/power?

Hot topic of debate in the PCB fandom

Ideally have as many ground planes as possible because they are consistent, shield between layers, minimize ground paths

If gnd/power on outside, they shield signal layers from EMI



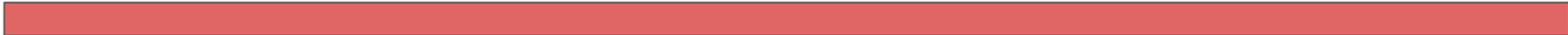
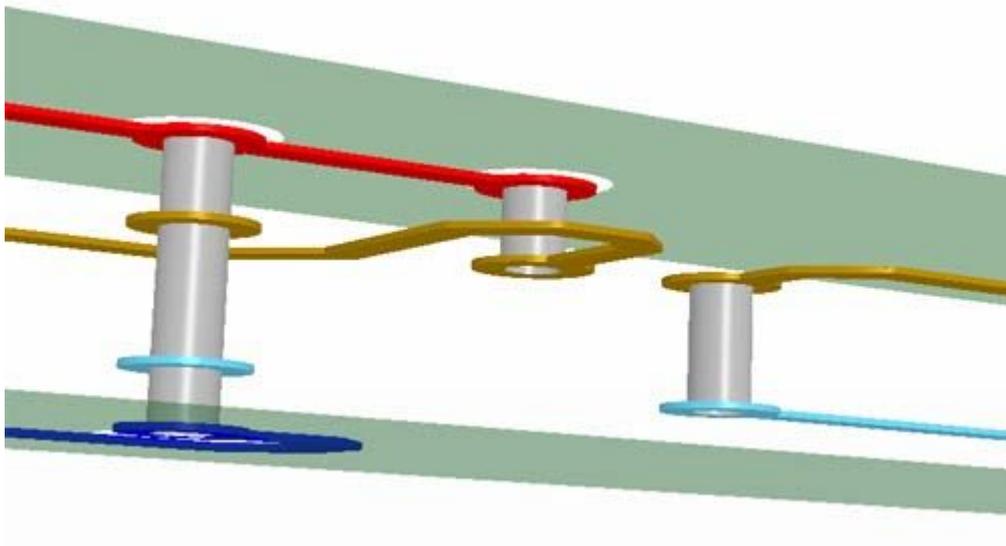


Blind/Buried Vias

Don't go all the way through board

Much more expensive because it's a different process

Useful for many layer boards that are also dense





Advanced Testing

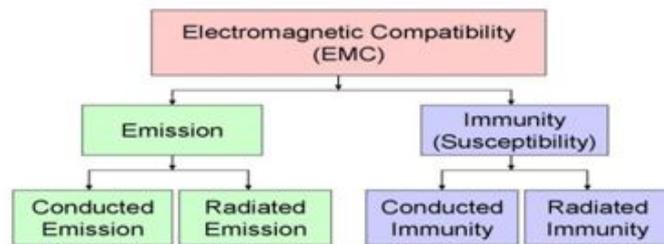
EMC - Your board should be impervious to interference as well as not create interference itself

- US/EU have different rules about this
- Class of device matters
- Different rules in different frequency spectrums

High Power

- If device is accidentally powered incorrectly due to bad wiring, shouldn't kill you
- If board will be attached to wall power, rules about spacing of gnd/power, DC/AC power

What is EMC?





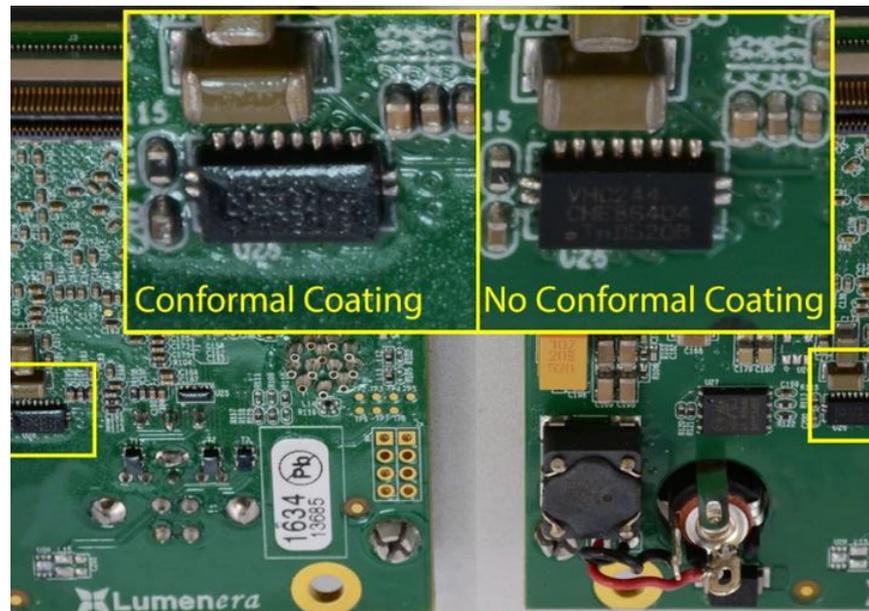
Protecting Board

Conformal coating

- If exposed, can use types of epoxy to cover sensitive components
- Can prevent shorts
- Only use on well-tested boards, a pain to remove

Mechanical Enclosure

- Can protect against elements
- Protects outside from high voltage as well





Flex Boards

Flexible boards - bend in one direction well

Often used for connectors for maintaining impedance matching

Can have components on them

Rigid-Flex - rigid in some places (where components are for instance), flexible in others

