

The background of the slide features a collage of images. In the top left, a woman with short brown hair is smiling and talking on a mobile phone. In the bottom right, a close-up of a human eye is visible. The central focus is on various electronic components: a small purple rectangular device, a larger white rectangular device, a black rectangular device with many pins, and a grey rectangular device with multiple ports. A printed circuit board (PCB) is also visible in the foreground.

Accton
Making Partnership Work

PCB design Consideration for EMI

Agenda



- Introduction
- Stackup
- 20H rule
- Transmission Line
- The Path of Least Inductance
- Example
- Conclusion

Introduction



Method for EMI improve

- For Plane

- Stackup
- Power Plane Fringing and $20H$ relation

- Transmission Line

- Path of least Inductance

Stackup 4 Layers PCB



- *Power and Ground Plane distance*
Electromagnetic Flux eliminate
- *Microstrip & Stripline*

Stackup1

Signal
Ground
Power
Signal

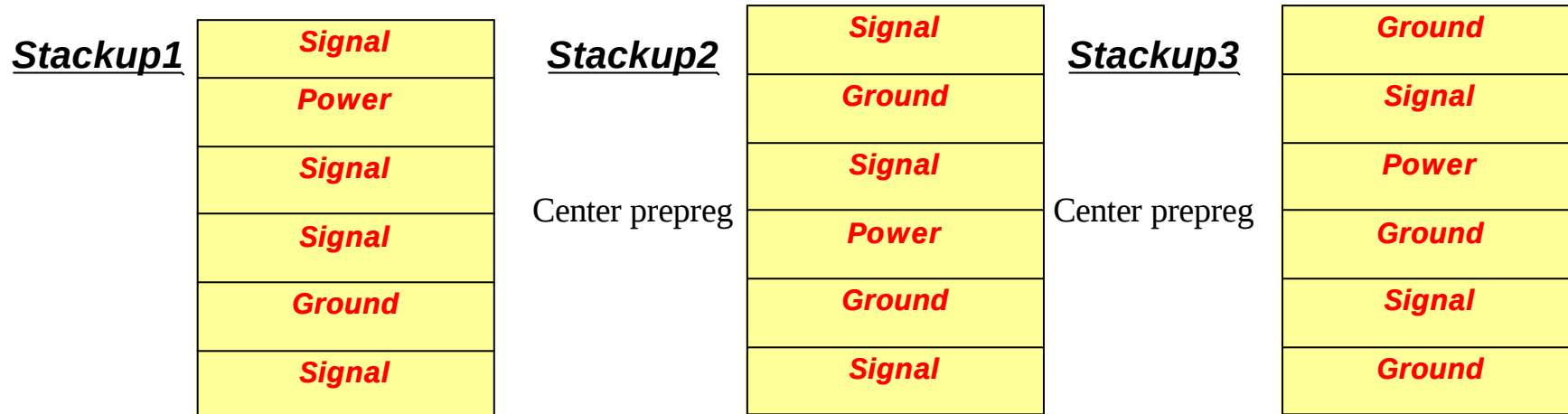
Stackup2

Ground
Signal / Power
Signal / Power
Ground

- *Far Distance Between Ground & Power Layer*
- *Best EMI Reduction*

PCB Thickness is 1.6mm, 62mil—Center prepreg 48mil ,side prepreg 4mil

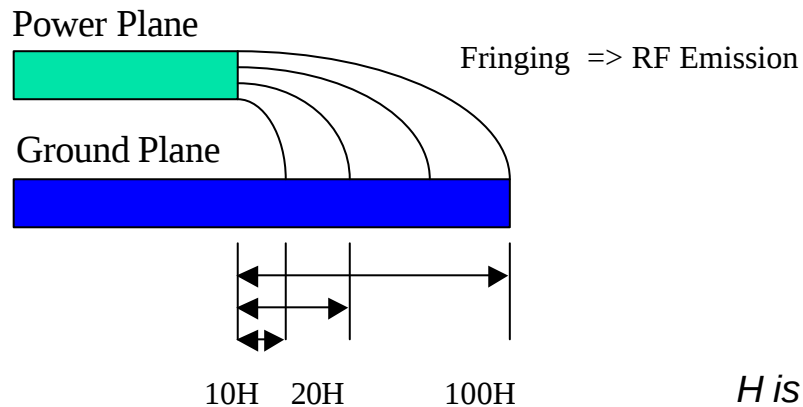
Stackup 6 Layers PCB



- *Bad EMI Reduction, Good Signal Impedance Control*
- *Signal & Power Layer Near Ground Layer, Difficult To Manufacture (short)*
- *Best EMI Reduction, Only Two Layers Can Route Trace*

PCB Thickness is 1.6mm, 62mil—Center prepreg 33mil, side prepreg 4mil

20H Rule



20H 70% Flux boundary
100H 98% Flux boundary

H is distance between Power and Ground plane.

*Power Plane generate the Fringing effect between Power Plane and Ground Plane.
Ground Plane need bigger than Power Plane 20H.*

Ex:

PCB Thickness is 1.6mm, 6 layers Power plane and ground plane distance is 33mil. It is need 16mm.

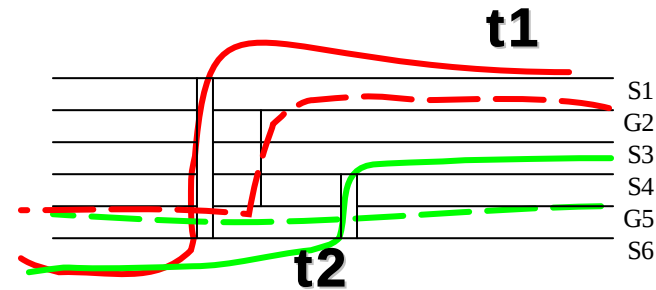
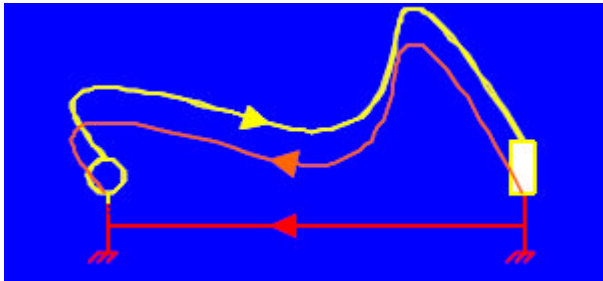
4 layers Power plane and ground plane distance is 44mil. It is need 22mm.

EMC Consideration of Transmission Line

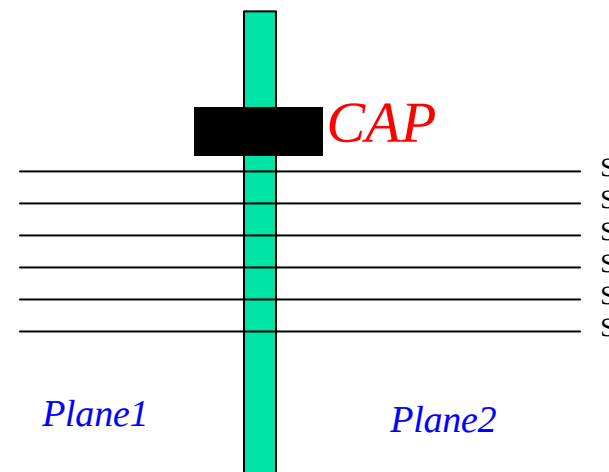
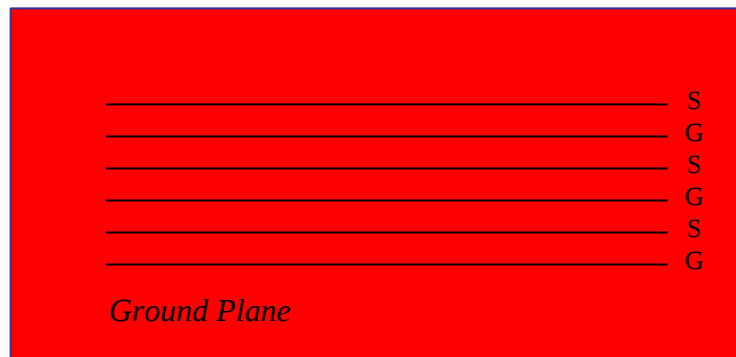


- Trace Impedance control
 - *Stackup, if trace length longer than($\lambda/20$), it is better to control the trace impedance*
- Reduce the Cross talk
 - *Spacing between the adjacent traces*
- To separate circuit for Analog / Digital /Power
 - *Avoid the noise coupling*
- Make the path of least Inductance
 - *By Via ,to create the short return path*

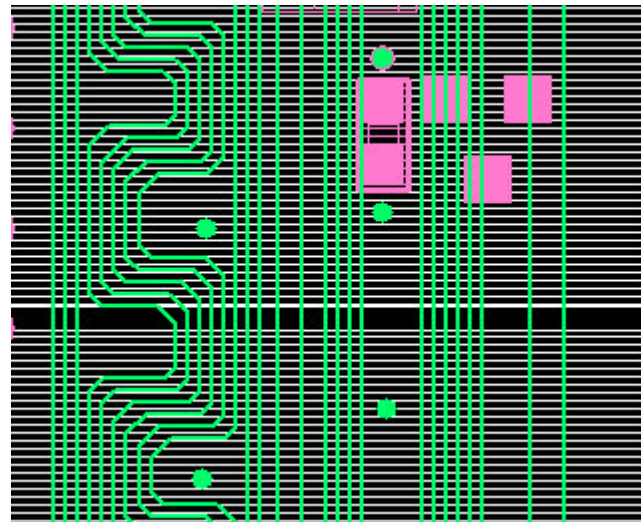
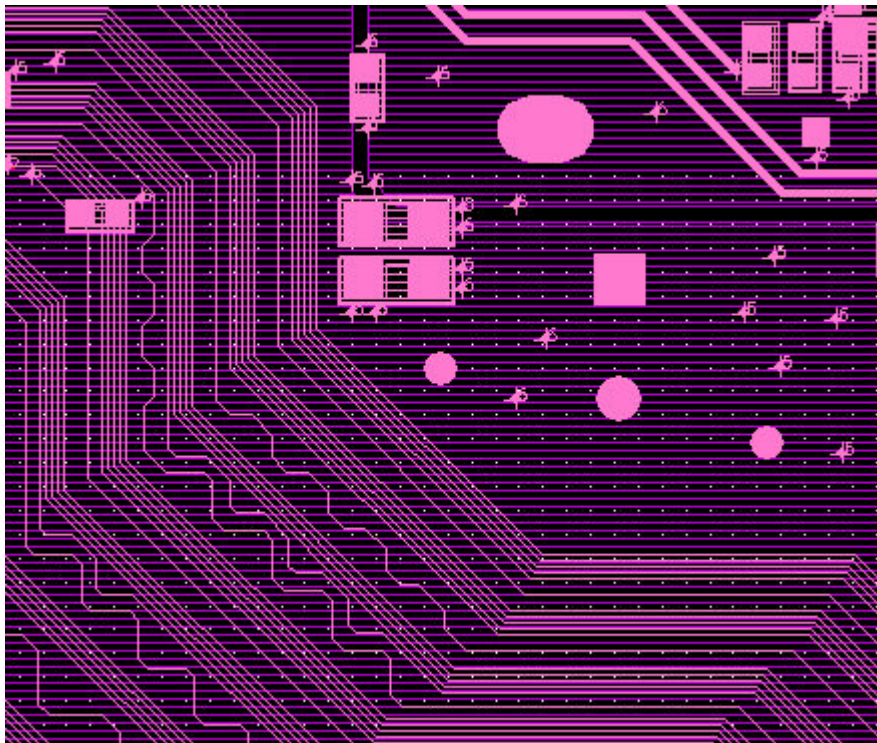
Path of Least Inductance



*LOW FREQUENCIES => the current will follow the path of LEAST RESISTANCE.
HIGH FREQUENCIES => the current will follow the path of LEAST INDUCTANCE.*



Example



Return path & Impedance control

Conclusion



- Stackup
 - Reduce the distance between power and ground plane will more easy to achieve the 20H rule
 - Under determined PCB outline, shrink the power plan edge as much as possible to achieve 20H rule
- Transmission Line
 - Make the return path to be least inductance.

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