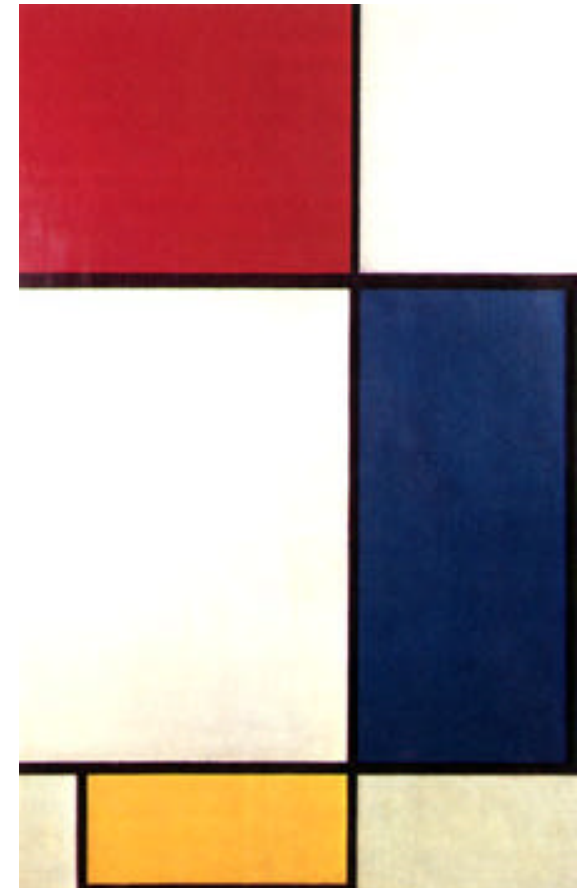
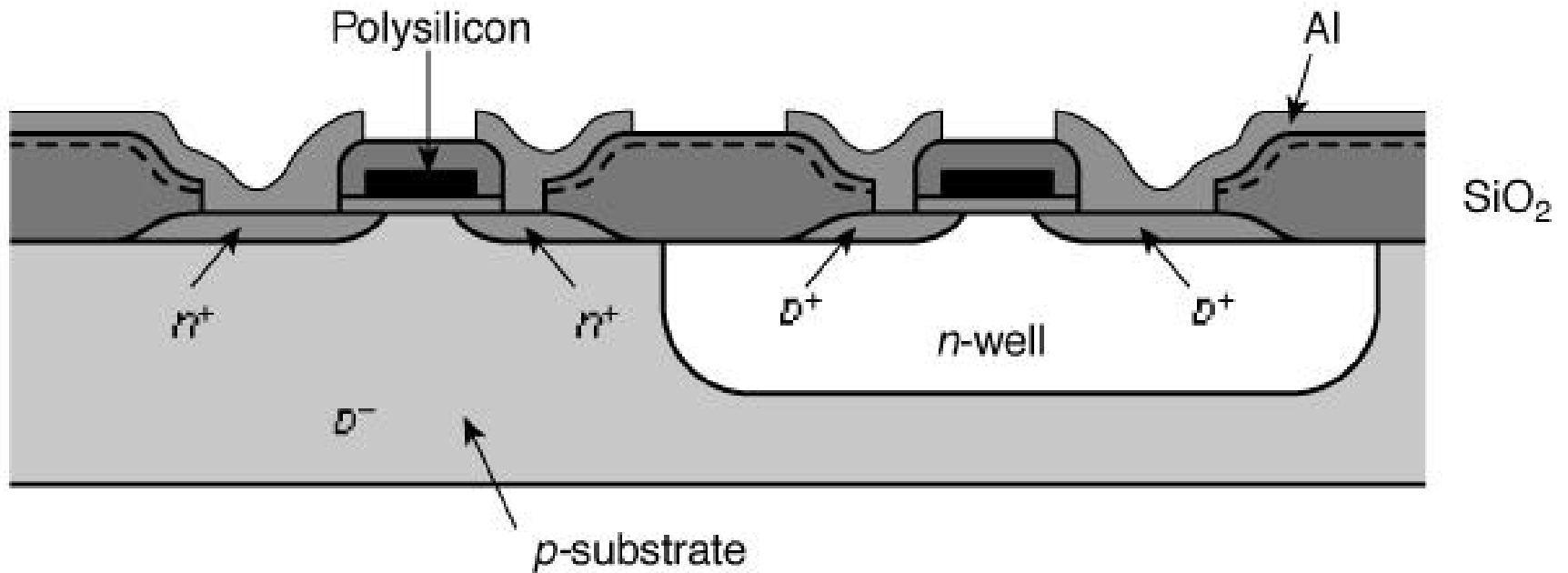

Design Rules

Jan M. Rabaey





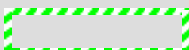





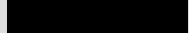
Cross-Section of CMOS Technology



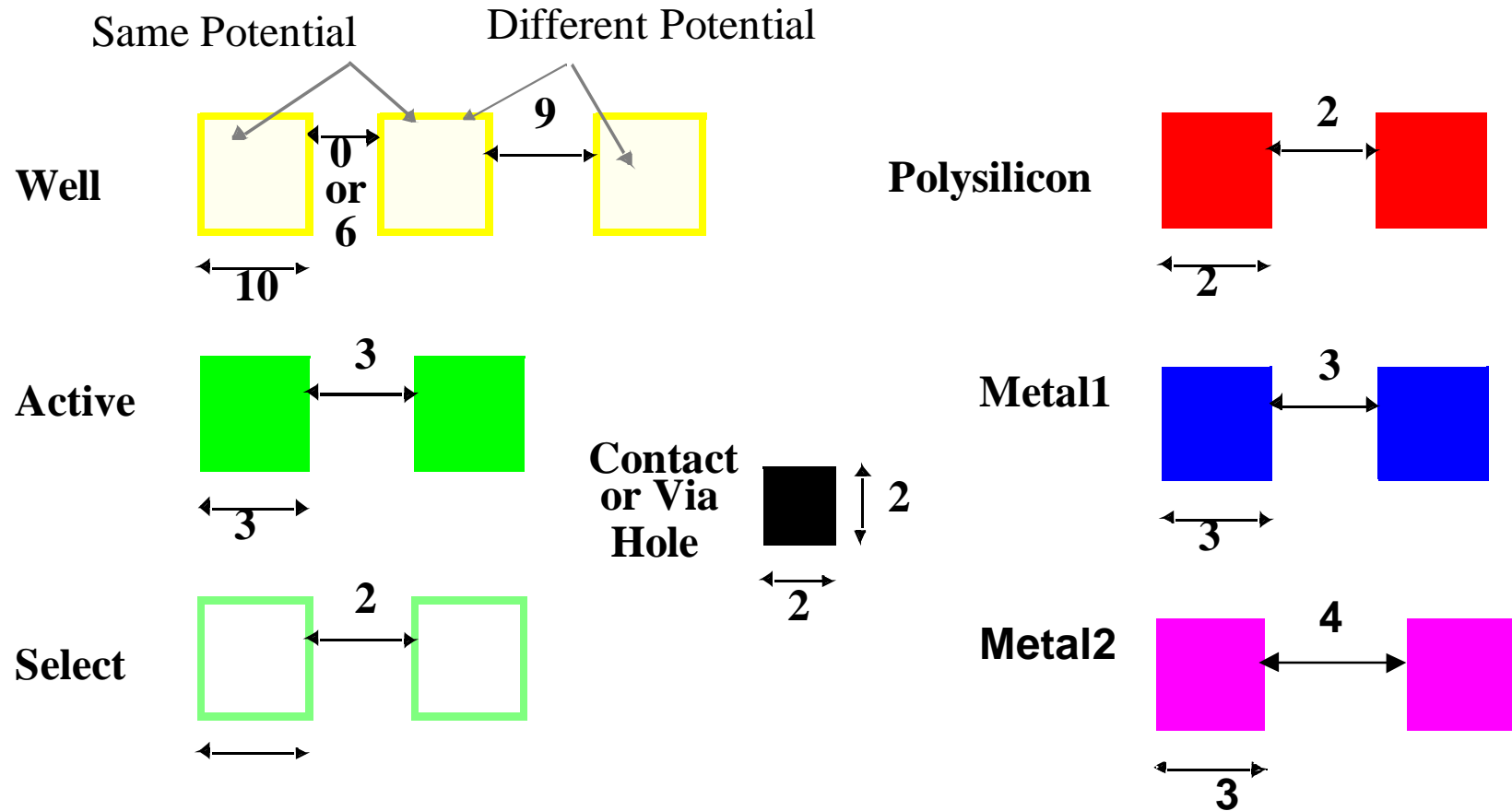
Design Rules

- Interface between designer and process engineer
- Guidelines for constructing process masks
- Unit dimension: Minimum line width
 - » scalable design rules: lambda parameter
 - » absolute dimensions (micron rules)

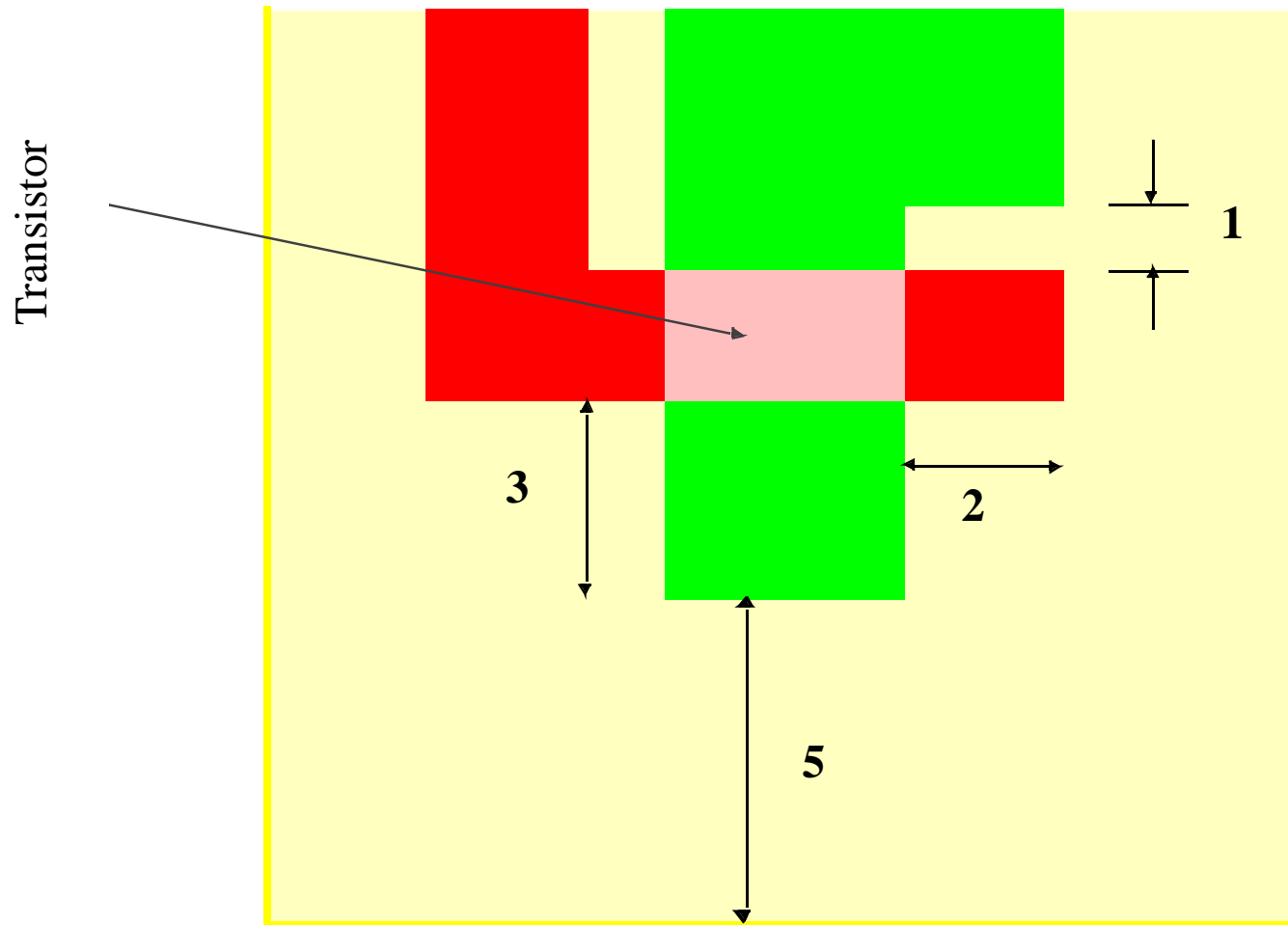
CMOS Process Layers

Layer	Color	Representation
Well (p,n)	Yellow	
Active Area (n+,p+)	Green	
Select (p+,n+)	Green	
Polysilicon	Red	
Metal1	Blue	
Metal2	Magenta	
Contact To Poly	Black	
Contact To Diffusion	Black	
Via	Black	

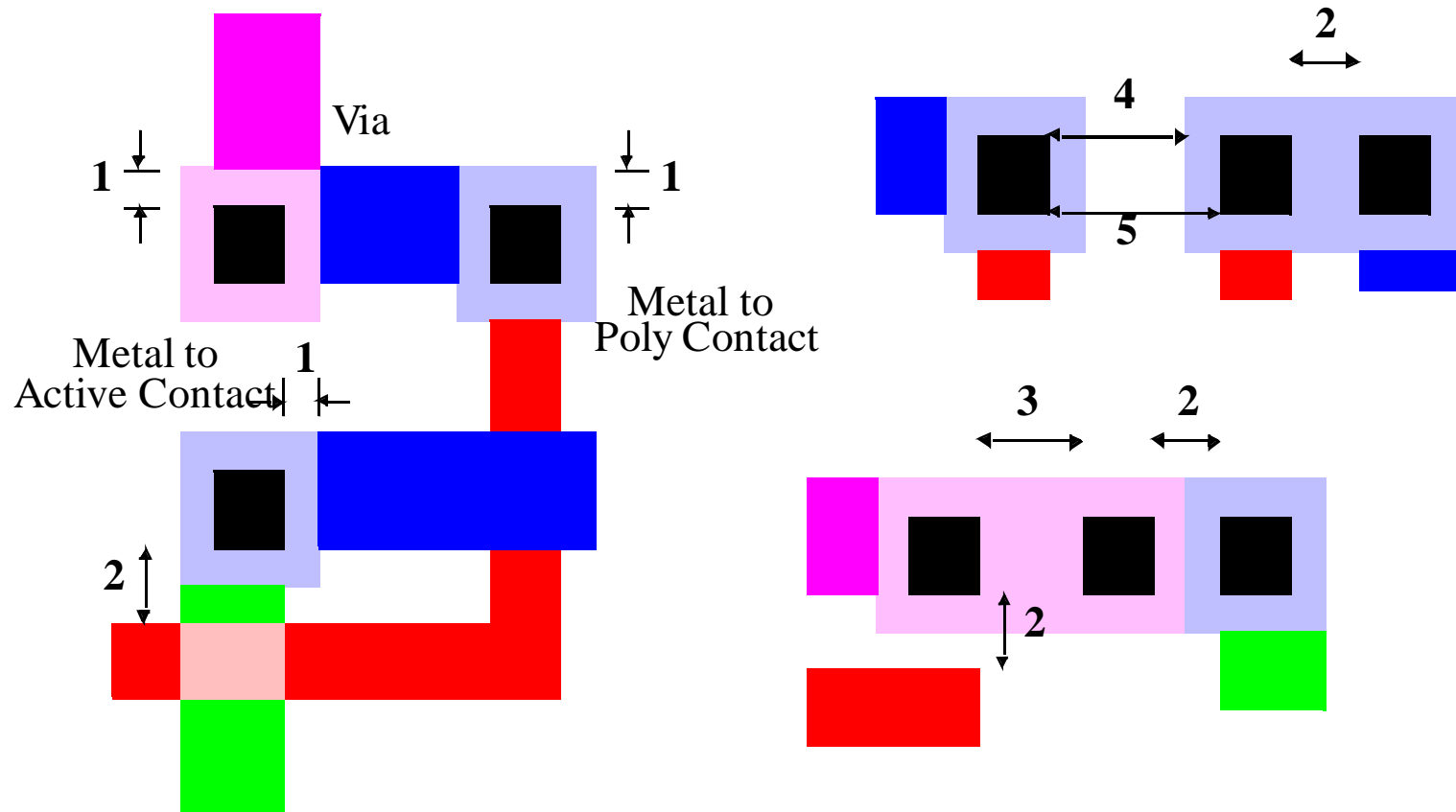
Intra-Layer Design Rules



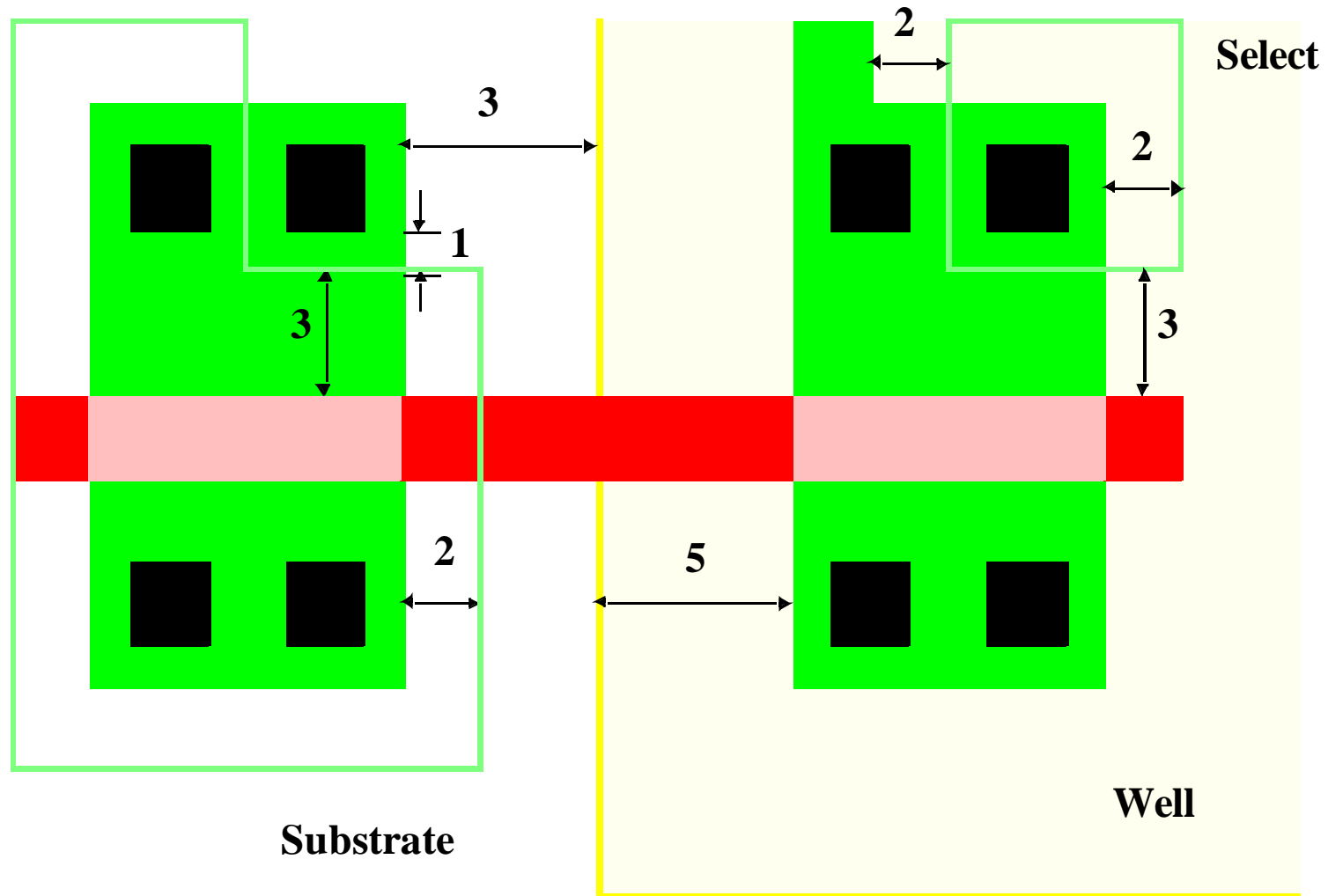
Transistor Layout



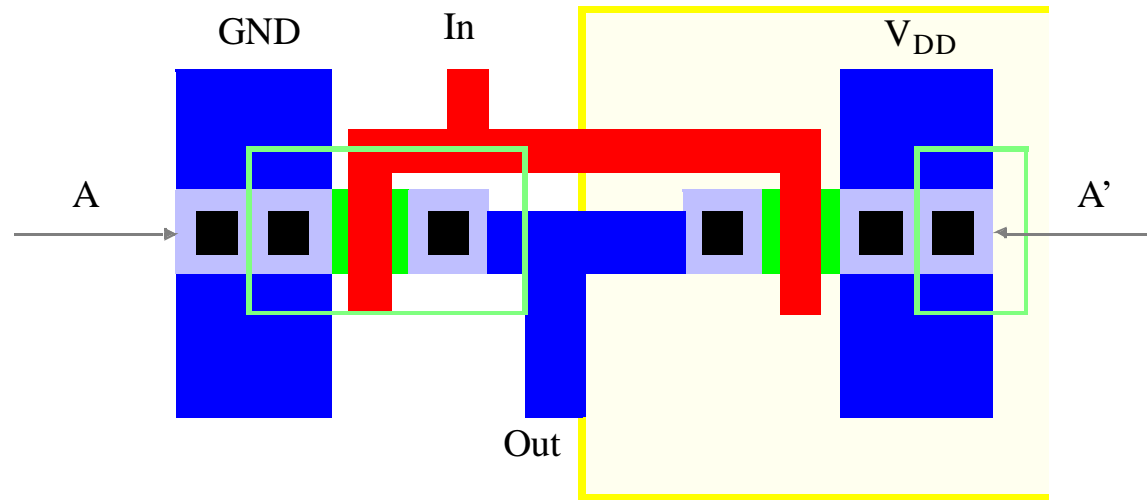
Via's and Contacts



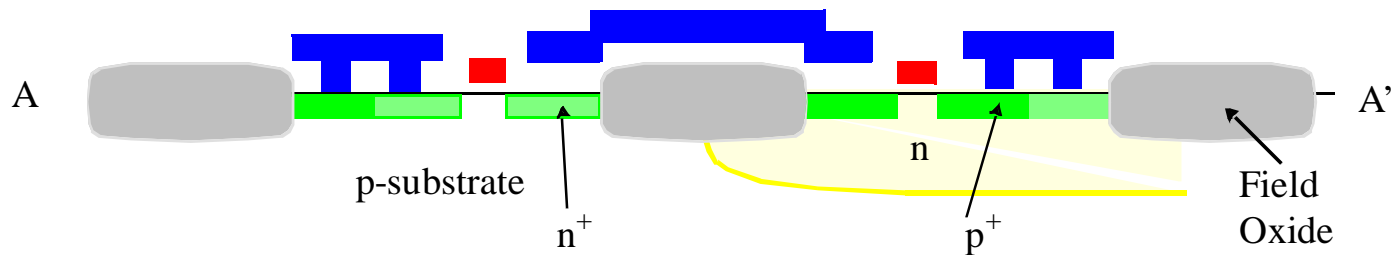
Select Layer



CMOS Inverter Layout



(a) Layout



(b) Cross-Section along A-A'