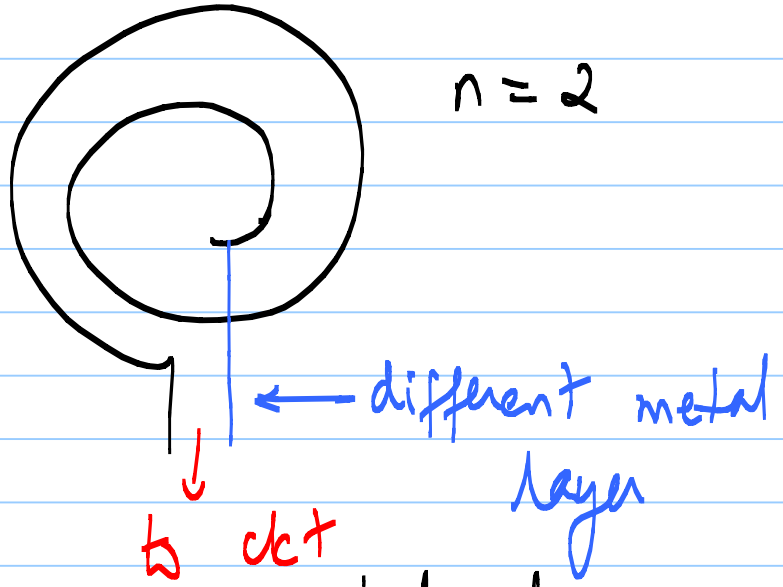
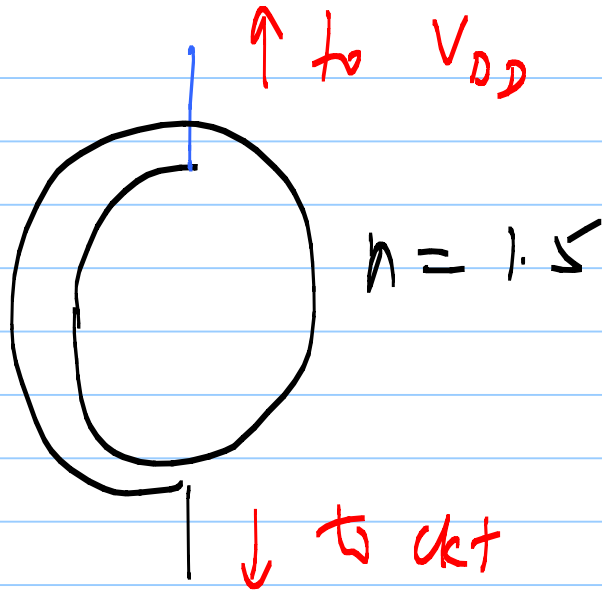
3/3/20

Lec 20





choice of metal layer

1) Minimum resistance → sheet resistance
   - thickness of metal layer
   - type of metal

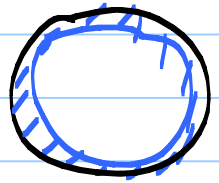
normally — higher layers are thicker

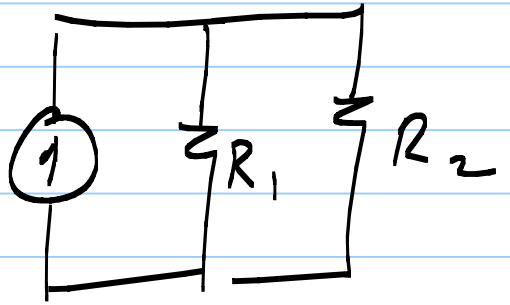
2) Wide traces → leads to higher Cpar.

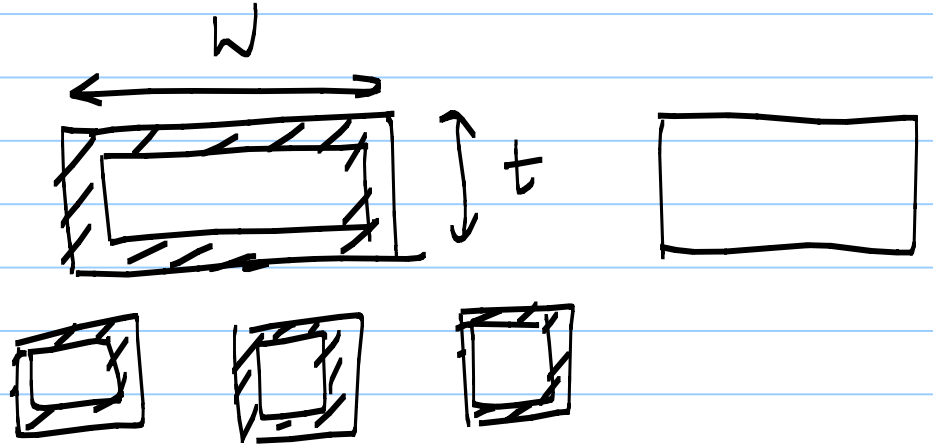
⇒ use higher metal layers for lowest possible Cpar to substrate

3) Skin effect

RF current flows in an annular ring near the surface







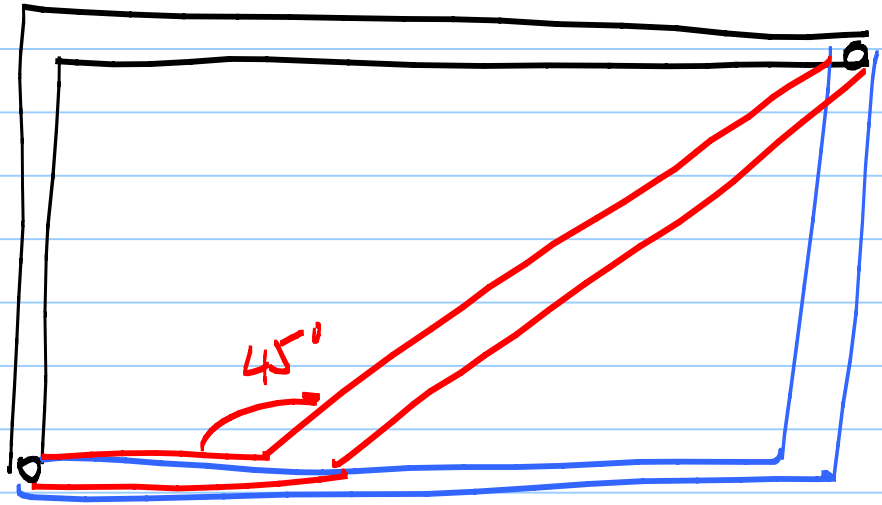
Skin depth

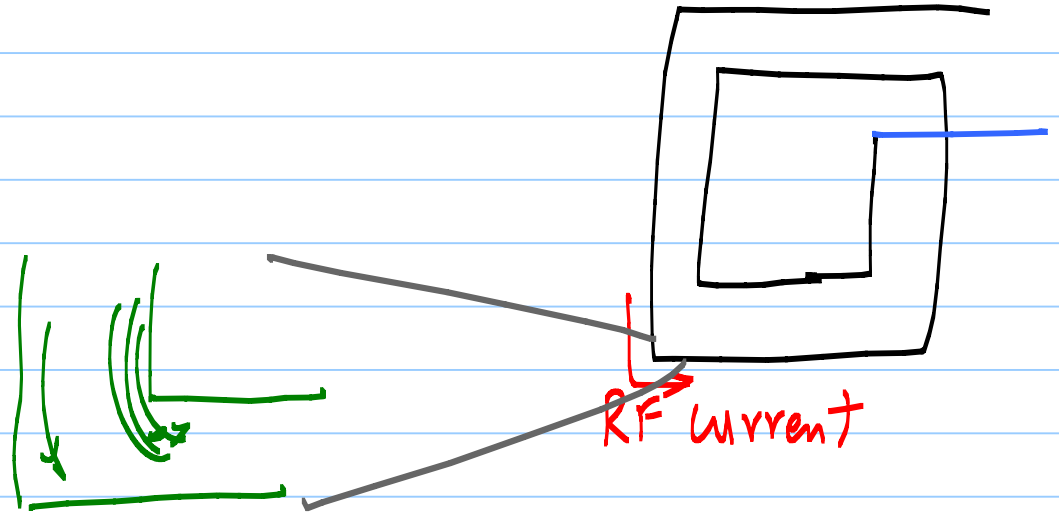
$$\delta = \sqrt{\frac{2}{\mu \sigma \omega}}$$

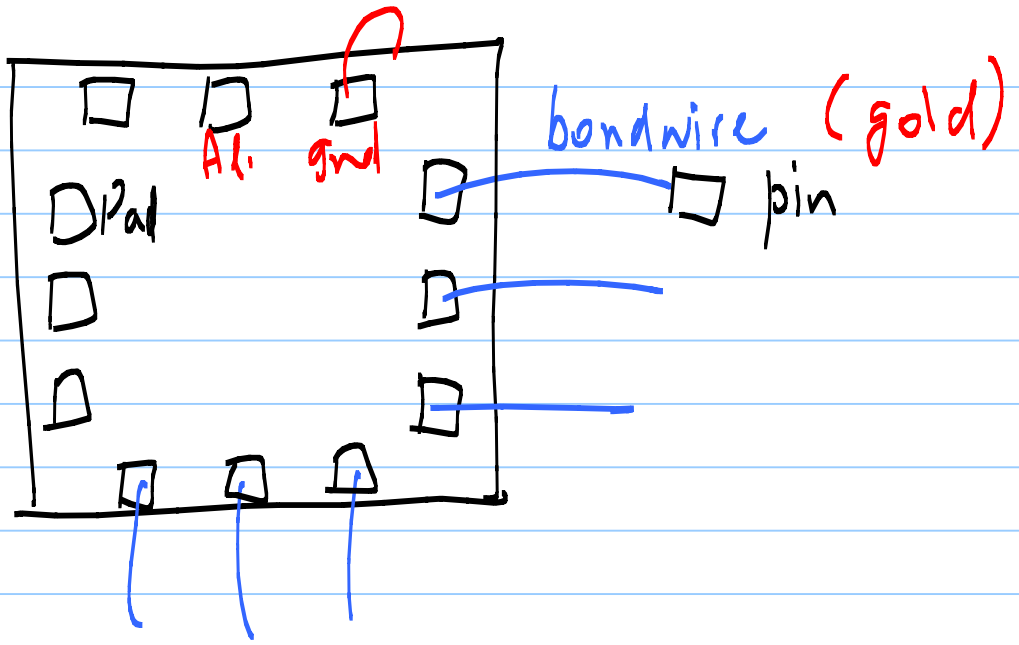
$\mu = \mu_0 \mu_r$

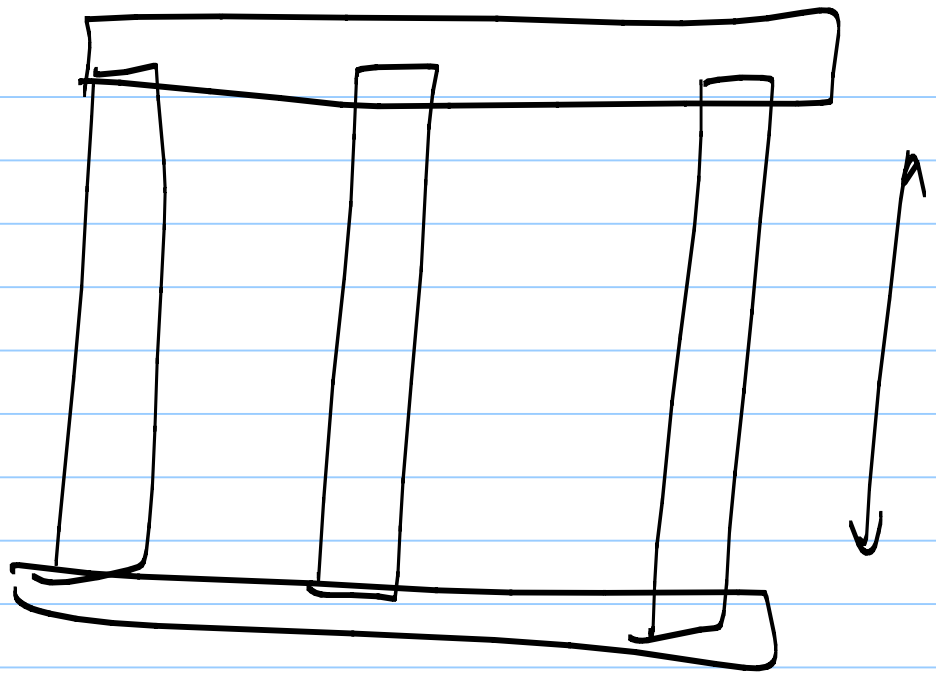
σ = conductivity

ω = angular freq.


45°

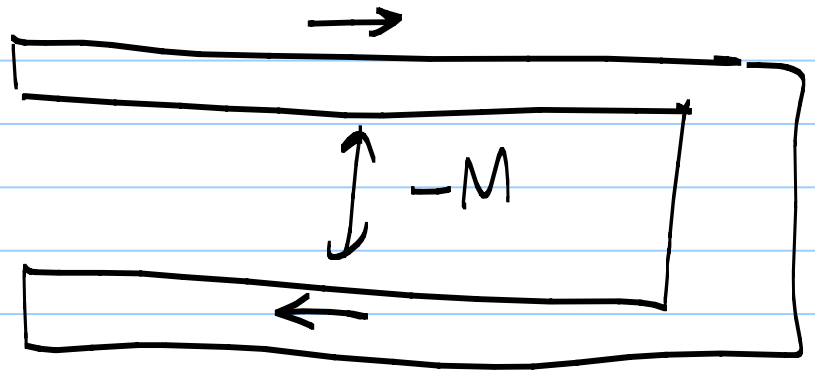

RF current


Al. gnd
bondwire (gold)
pin
Pad

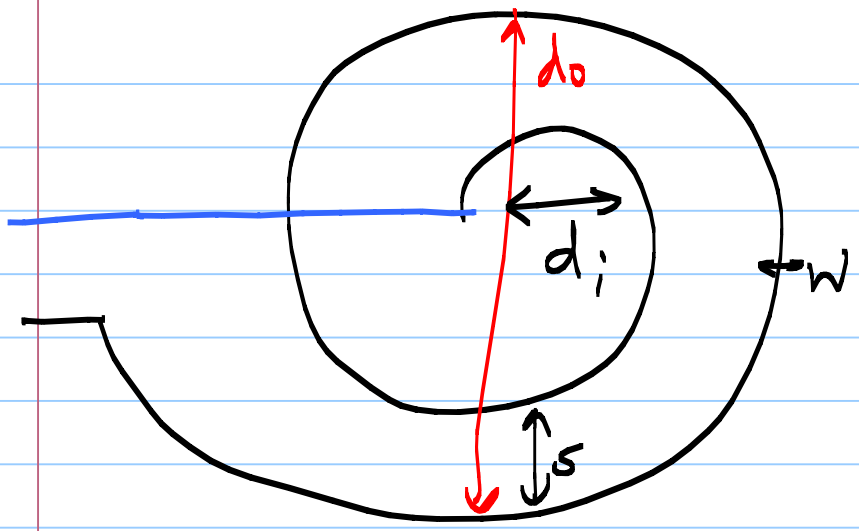


$L \sim 1nH/mm$

$l \sim mm$



Spiral ind. normally has large inner diameter to avoid -M



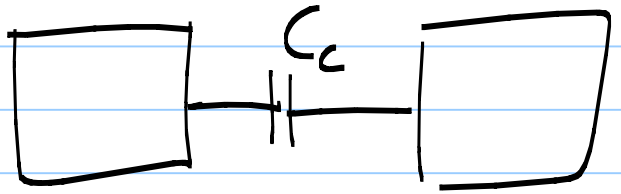
outer diameter d_o

inner diameter d_i

trace width w

turn spacing s

# of turns n



narrowband model of RF spiral inductor