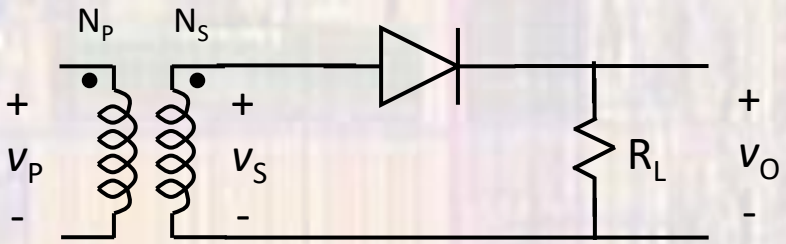
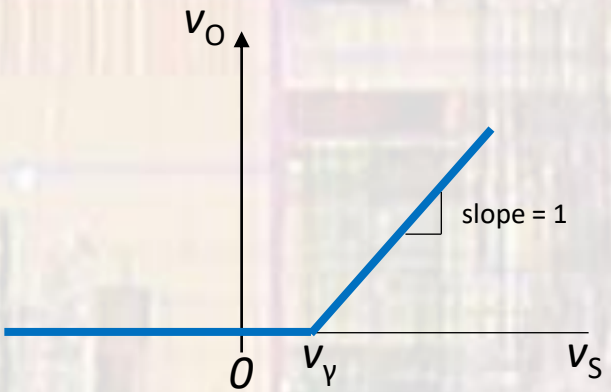
Half-Wave Rectifier

Last updated 12/8/21

Half-Wave Rectifier

- Basic Implementation

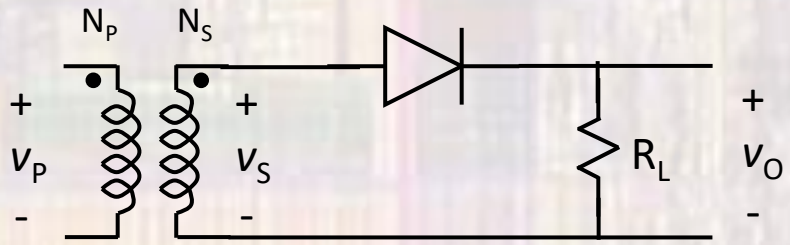




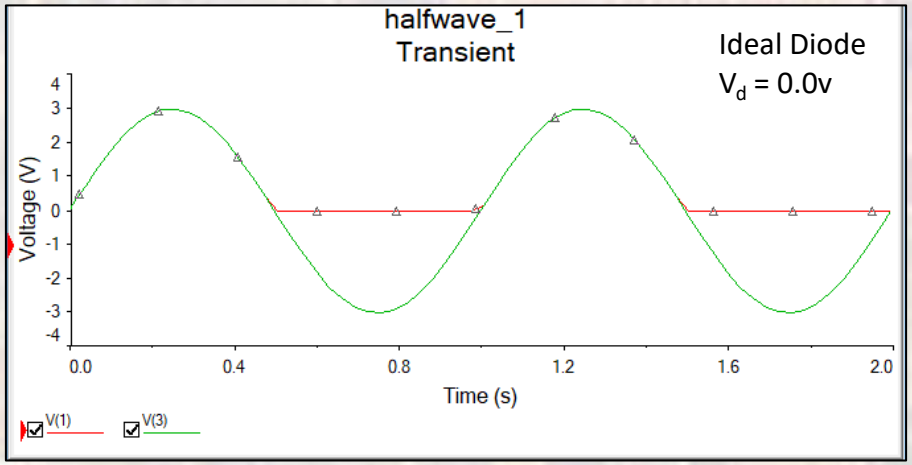
© tj

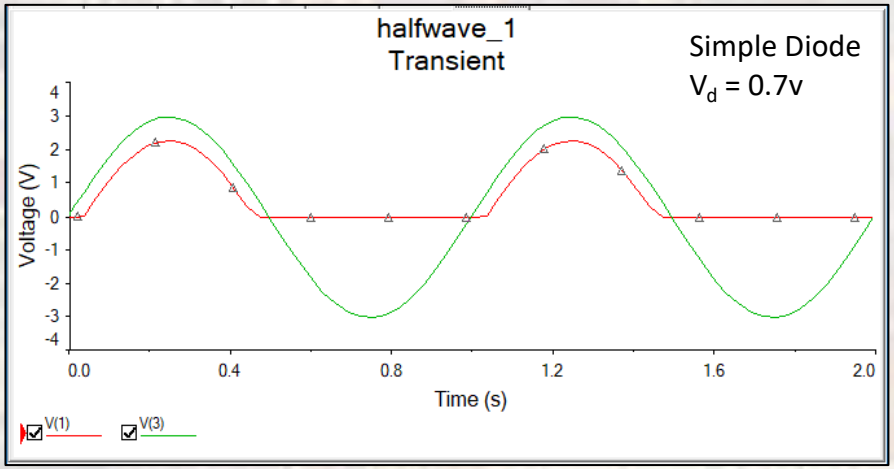
Half-Wave Rectifier

- Basic Implementation



$v_S = \pm 3V$

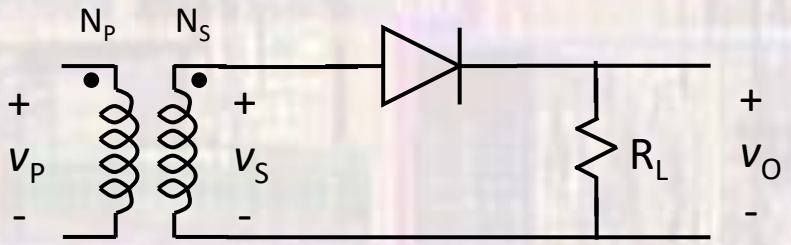


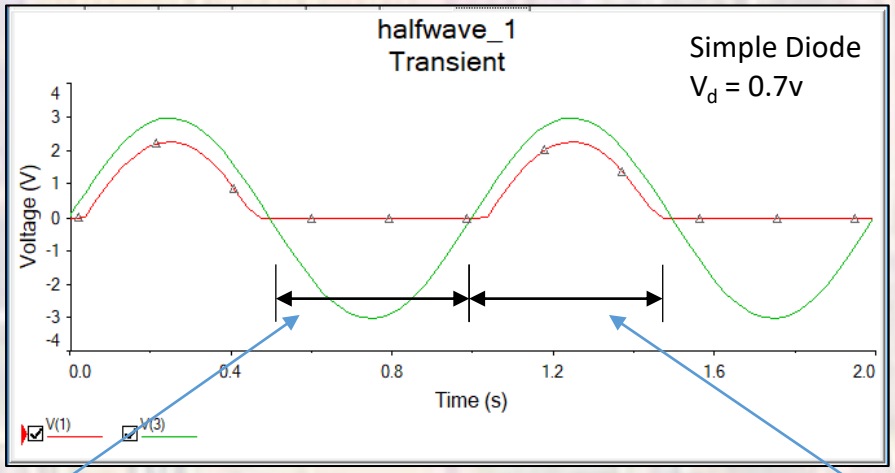


© tj

Half-Wave Rectifier

- Design Considerations





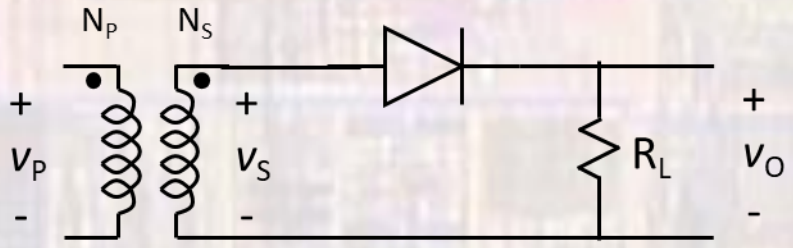
Reversed biased region
$v_D max = -v_S peak$
→ breakdown requirement

Forward biased region
$i_D max = (v_S peak – v_D)/R$
→ current requirement

© tj

Half-Wave Rectifier

- Design Example
  - 120v rms primary voltage
  - Transformer turns ratio: 12
  - Load resistance: 1KΩ



- What are the diode requirements?

Breakdown:

120v rms, 12 turns ratio → v_S = 10v rms

10v rms → $v_S$peak = 14.14v

Current:

(14.14v - v_D)/1KΩ → 14.14ma – v_D/1ΩK

typical v_F is 0.6v → 13.54ma

guard band the design:

$v_F \approx 0.6v$

$V_{breakdown} > 20v$ (14v rms)

$I_{max} > 20ma$

© tj