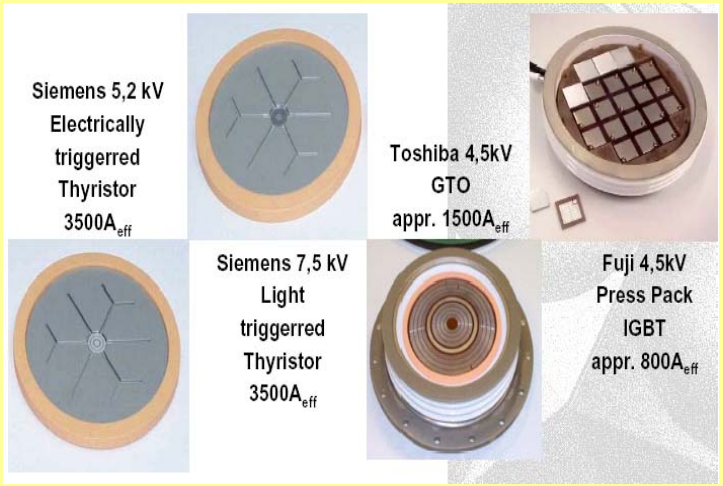
Thyristor Converters

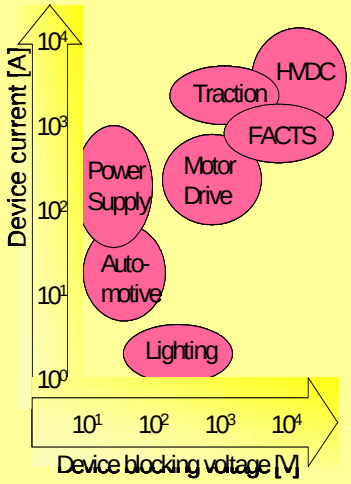
- Applications
- Basic Principles
- Single-Phase Thyristor Converters

CATEGORIZING POWER ELECTRONIC SYSTEMS

Solid-State Power Devices

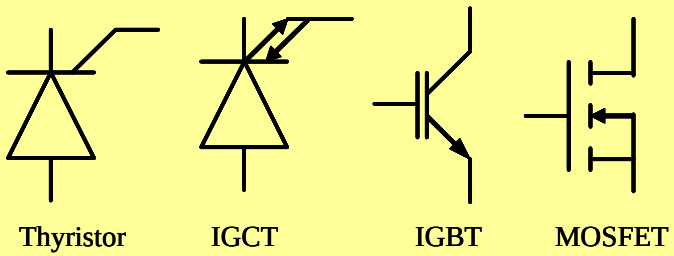


(*a*)

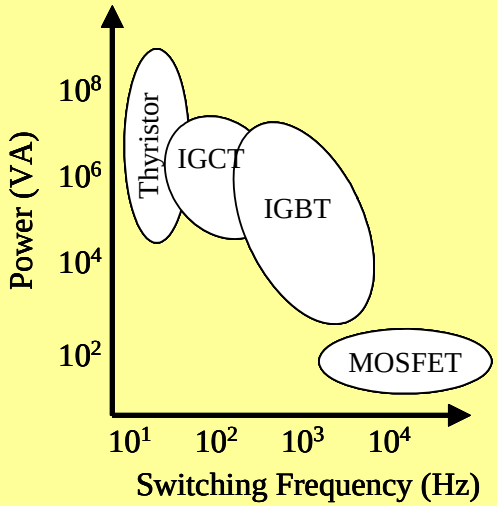


(*b*)

POWER SEMICONDUCTOR DEVICES AND THEIR CAPABILITIES

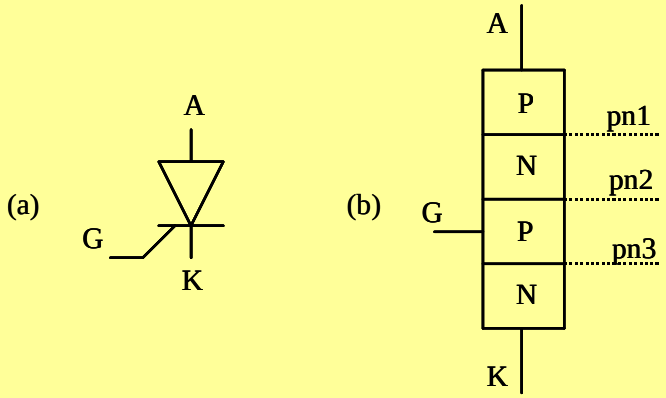


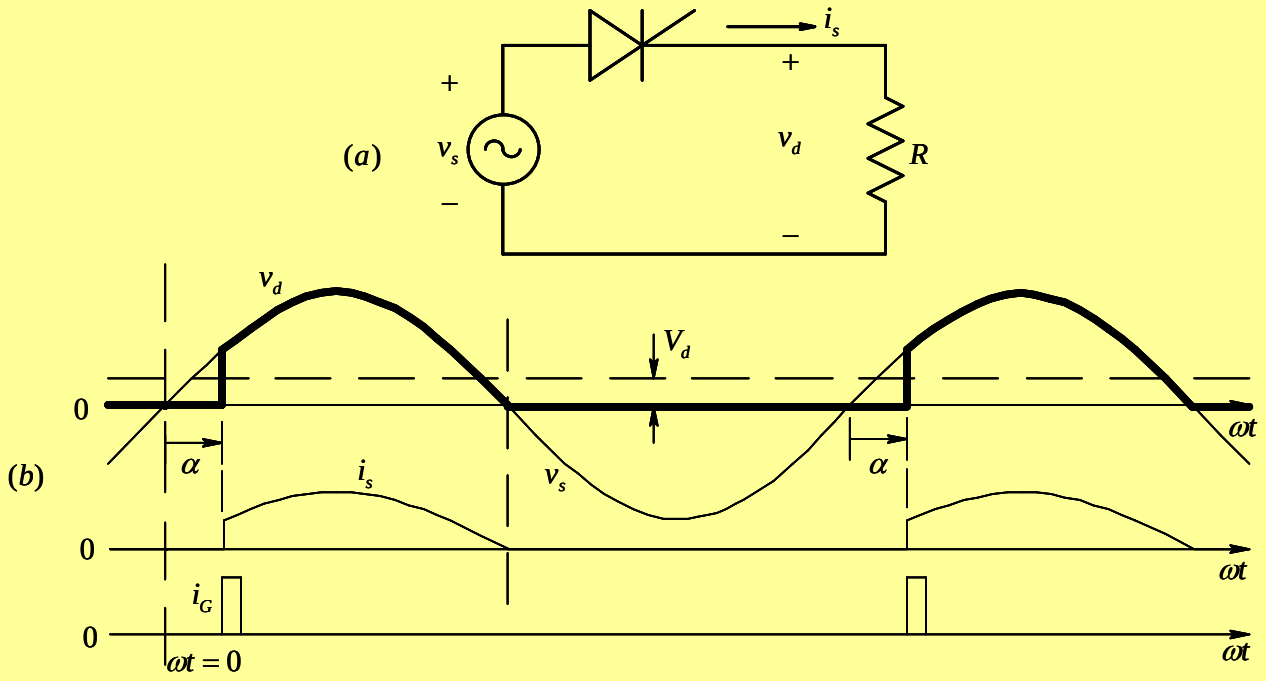
(a)



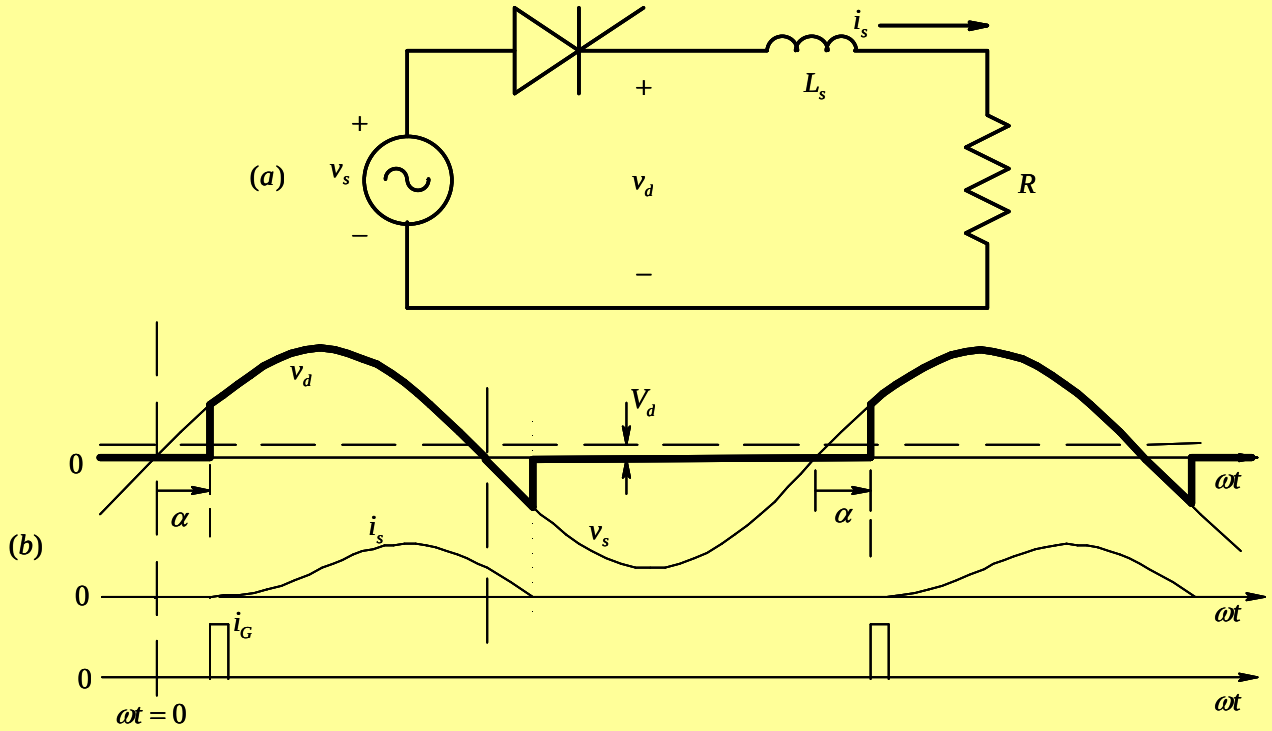
(b)

Thyristors (SCRs)

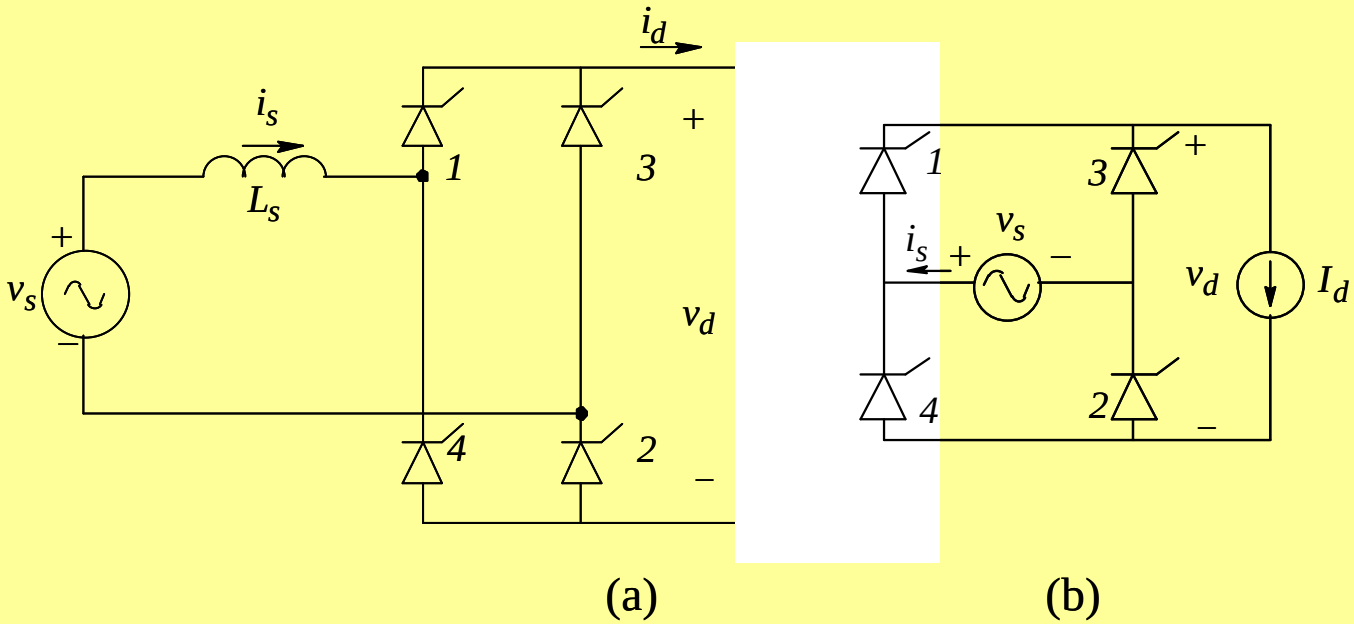




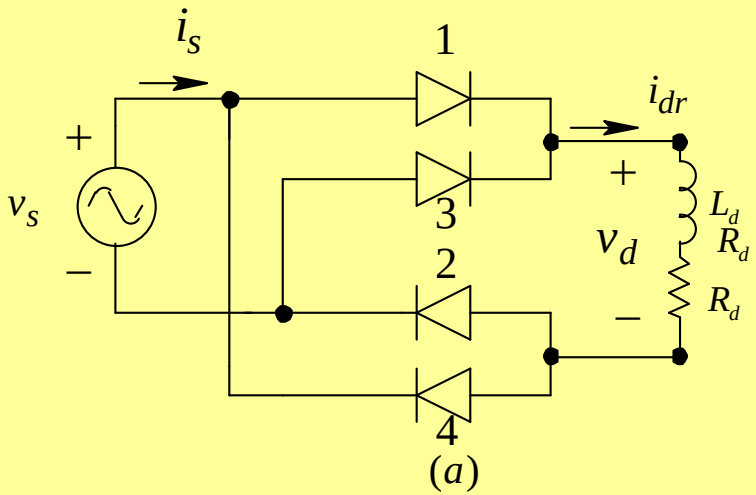
$$V_d = \frac{1}{2\pi}\int_{\alpha}^{\pi} \hat{V}_s \sin\omega t \cdot d(\omega t) = \frac{\hat{V}_s}{2\pi}(1+\cos\alpha)$$



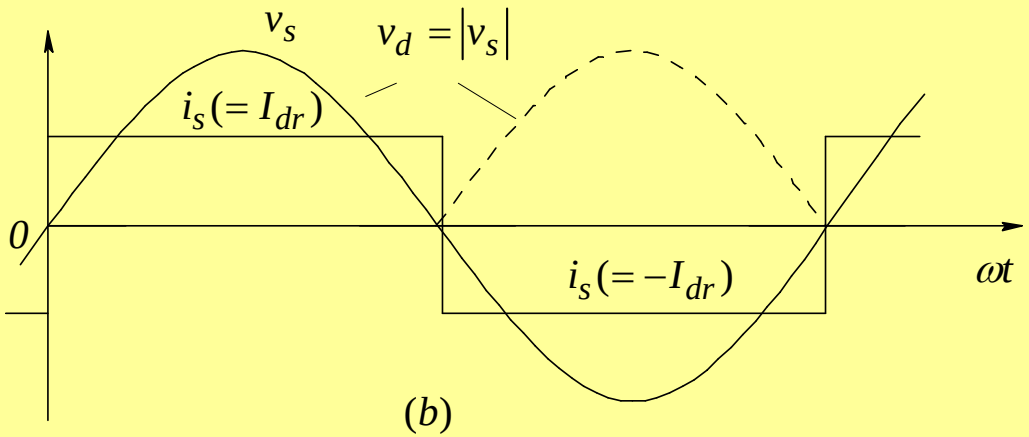
Single-Phase, Phase-Controlled Thyristor Converters



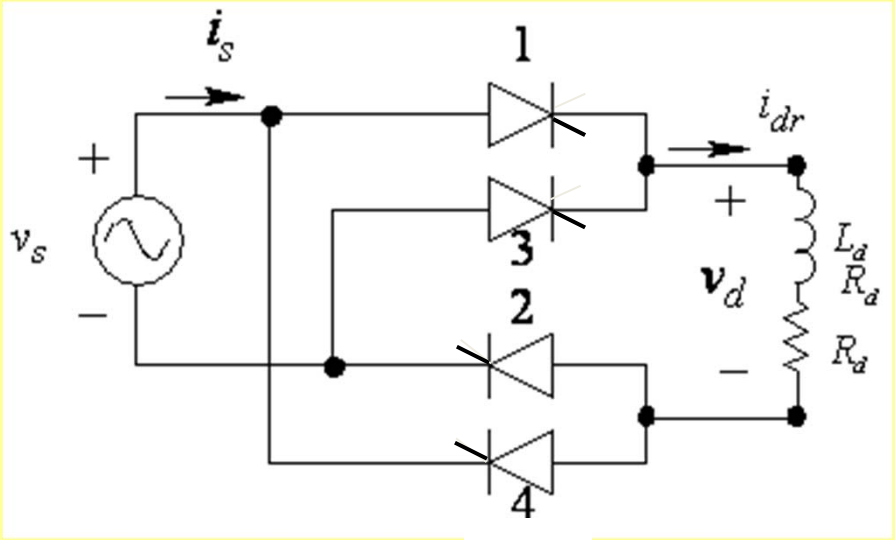
Review: Diode Rectifiers

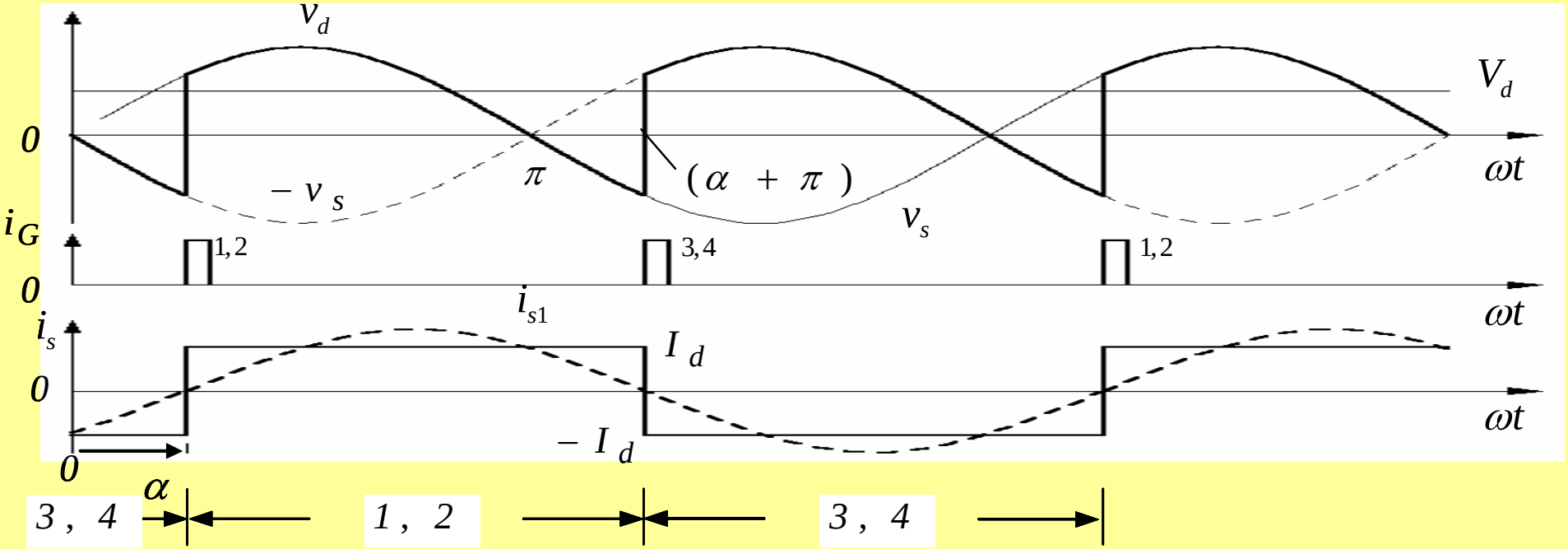


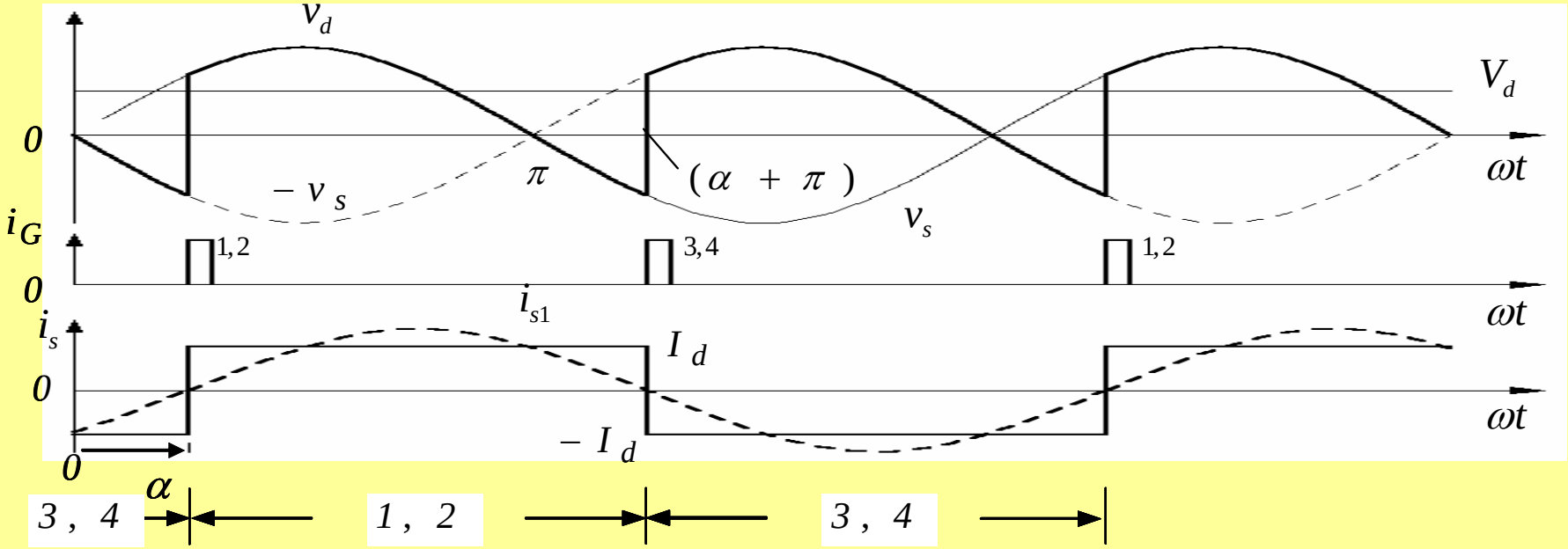
(a)



(b)







$$v_d(t) = v_s(t) \quad \text{and} \quad i_s(t) = I_d \qquad \alpha < \omega t \le \alpha + \pi$$

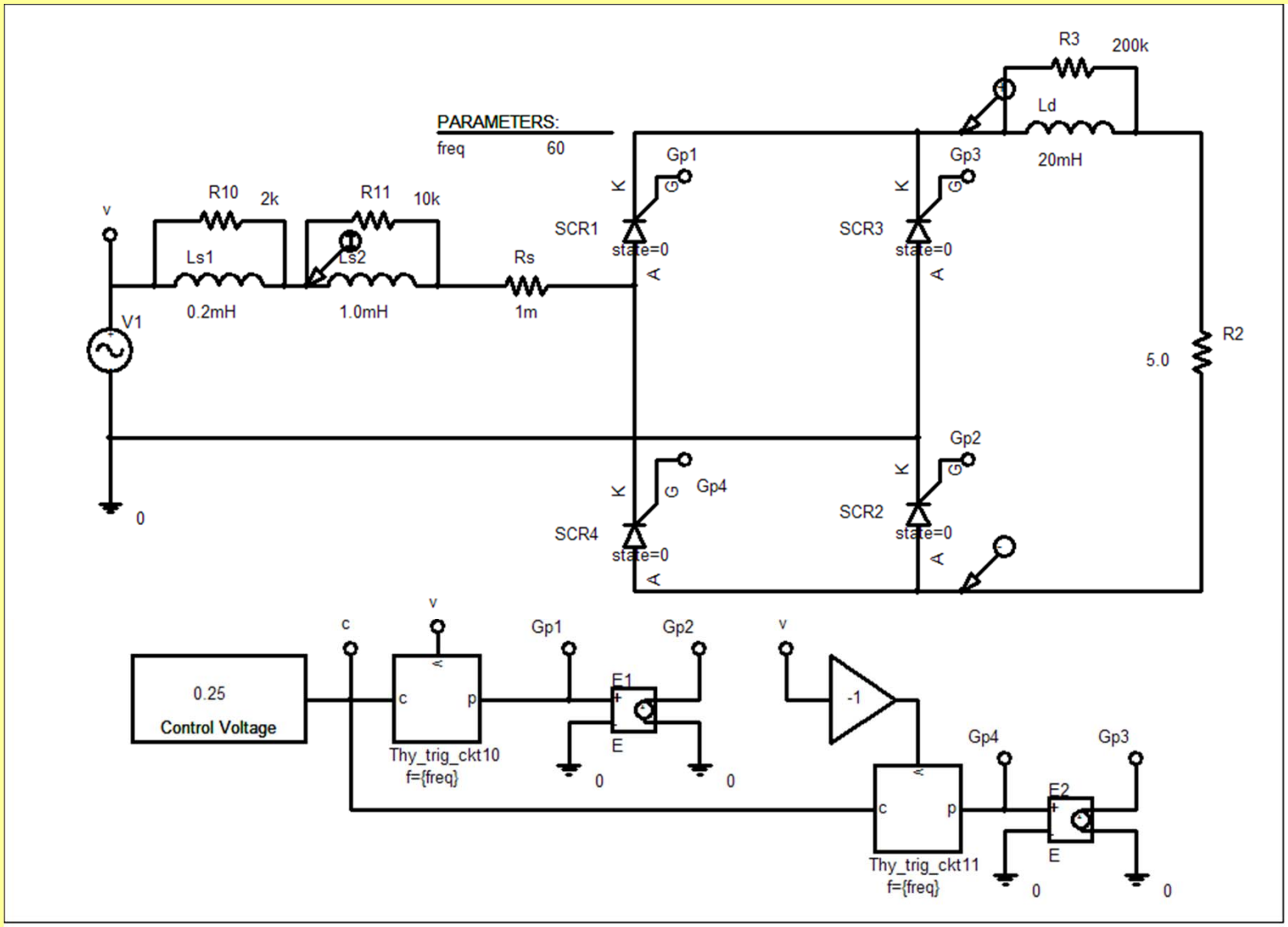
$$v_d(t) = -v_s(t) \quad \text{and} \quad i_s(t) = -I_d \qquad \alpha + \pi < \omega t \le \alpha + 2\pi$$

$$V_d = \frac{1}{\pi}\int_{\alpha}^{\alpha+\pi} \hat{V}_s \sin\omega t \cdot d(\omega t) = \frac{2}{\pi}\hat{V}_s \cos\alpha$$

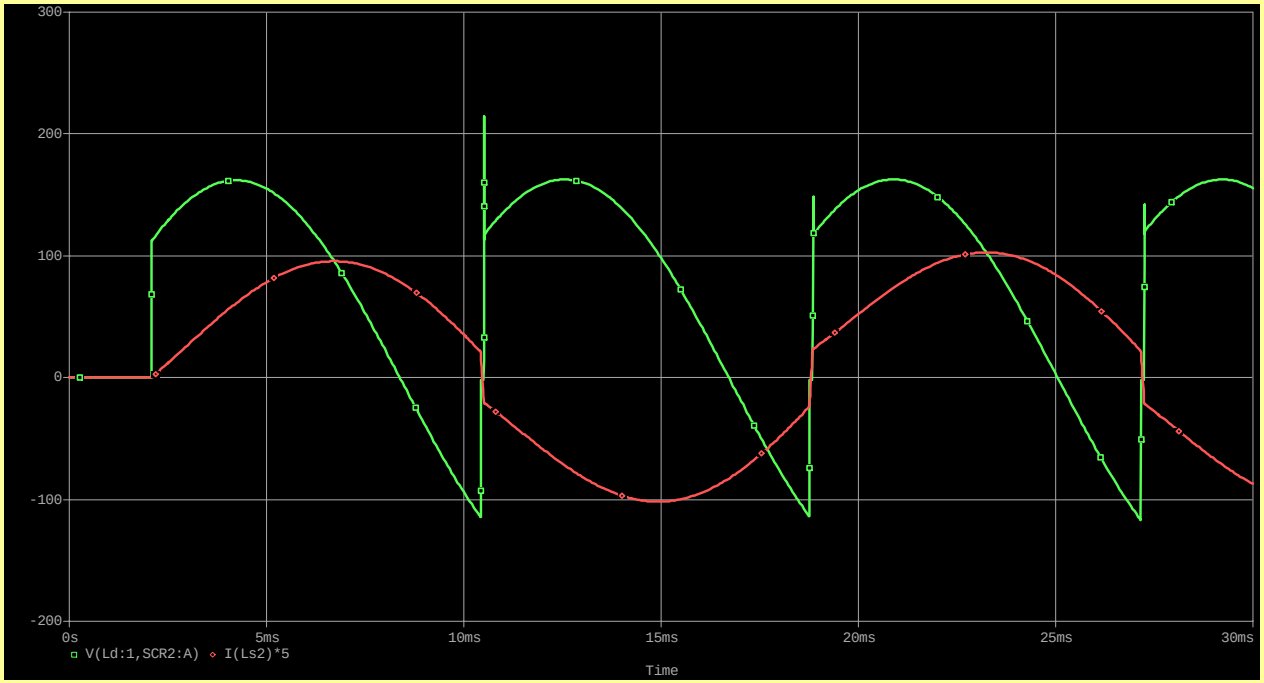
$$\hat{I}_{s1} = \frac{4}{\pi} I_d$$

$$P = \frac{1}{2}\hat{V}_s \hat{I}_{s1}\cos\alpha = V_d I_d$$

PSpice Modeling:



Simulation Results



Summary

- Applications
- Basic Principles
- Single-Phase Thyristor Rectifiers