

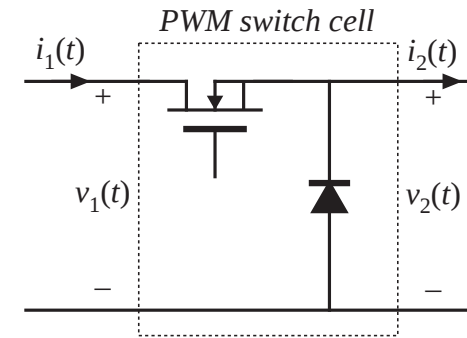
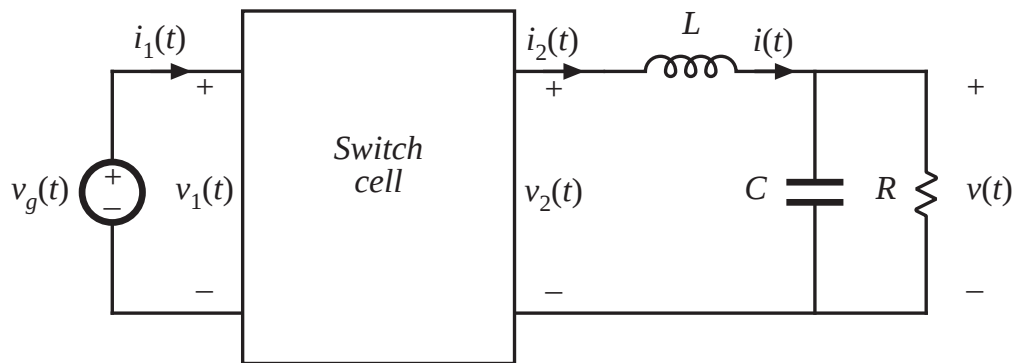
Chapter 20: Resonant Switch Topologies

- Introduction
- 20.1 The zero-current-switching quasi-resonant switch cell
 - 20.1.1 Waveforms of the half-wave ZCS quasi-resonant switch cell
 - 20.1.2 The average terminal waveforms
 - 20.1.3 The full-wave ZCS quasi-resonant switch cell
- 20.2 Resonant switch topologies
 - 20.2.1 The zero-voltage-switching quasi-resonant switch
 - 20.2.2 The zero-voltage-switching multiresonant switch
 - 20.2.3 Quasi-square-wave resonant switches
- 20.3 Ac modeling of quasi-resonant converters
- 20.4 Summary of key points

The resonant switch concept

General idea:

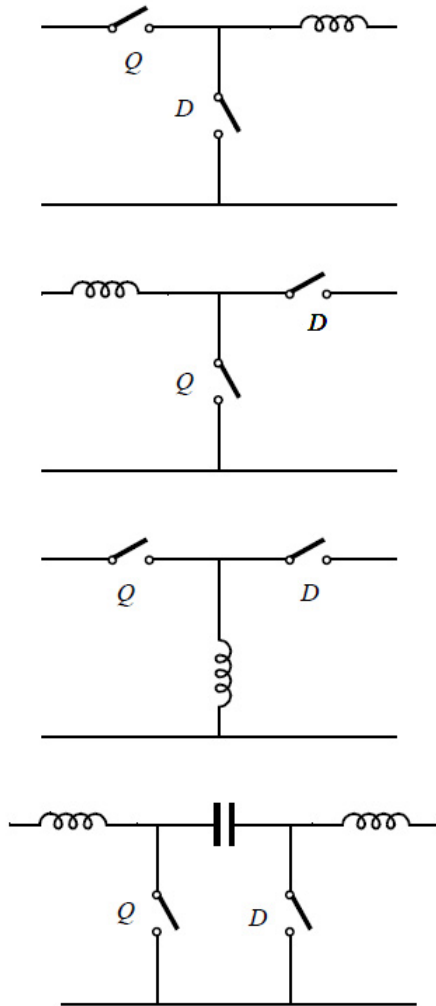
- PWM switch network is replaced by a resonant switch network
- This leads to a quasi-resonant or quasi-squarewave version of the original PWM converter



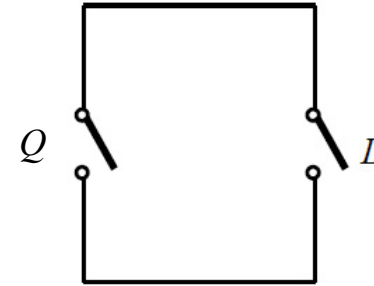
Example: realization of the switch cell in the buck converter

High Frequency Switch Network

Converter examples



High-frequency view of the switch network



Basic switch implementation options

Q : single-quadrant (transistor)

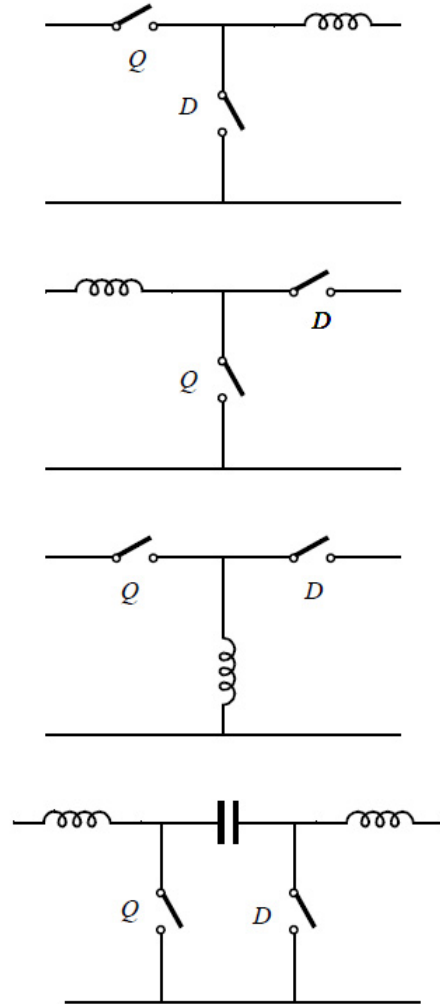
D : single-quadrant (diode)

Q : current-bidirectional (e.g. MOSFET)

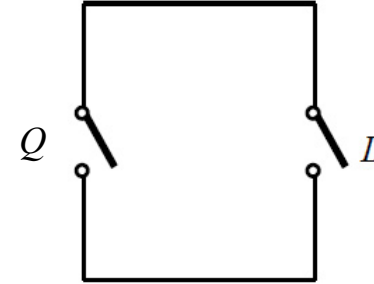
D : current-bidirectional synchronous rectifier
(e.g. MOSFET)

ZVS-QSW: Review

Converter examples



High-frequency view of the switch network



Basic switch implementation options

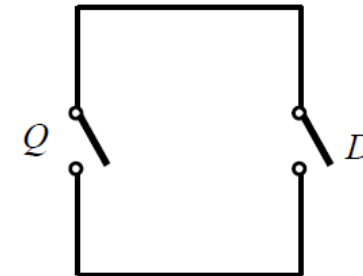
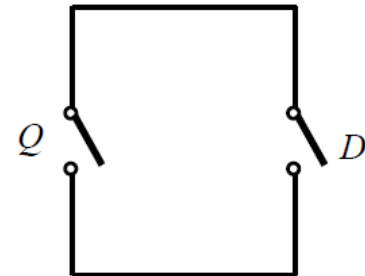
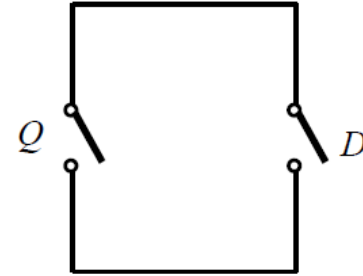
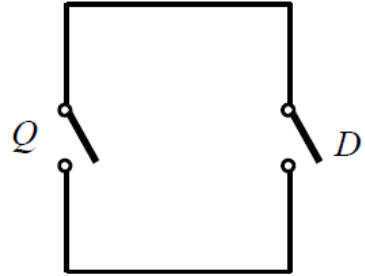
Q : single-quadrant (transistor)

D : single-quadrant (diode)

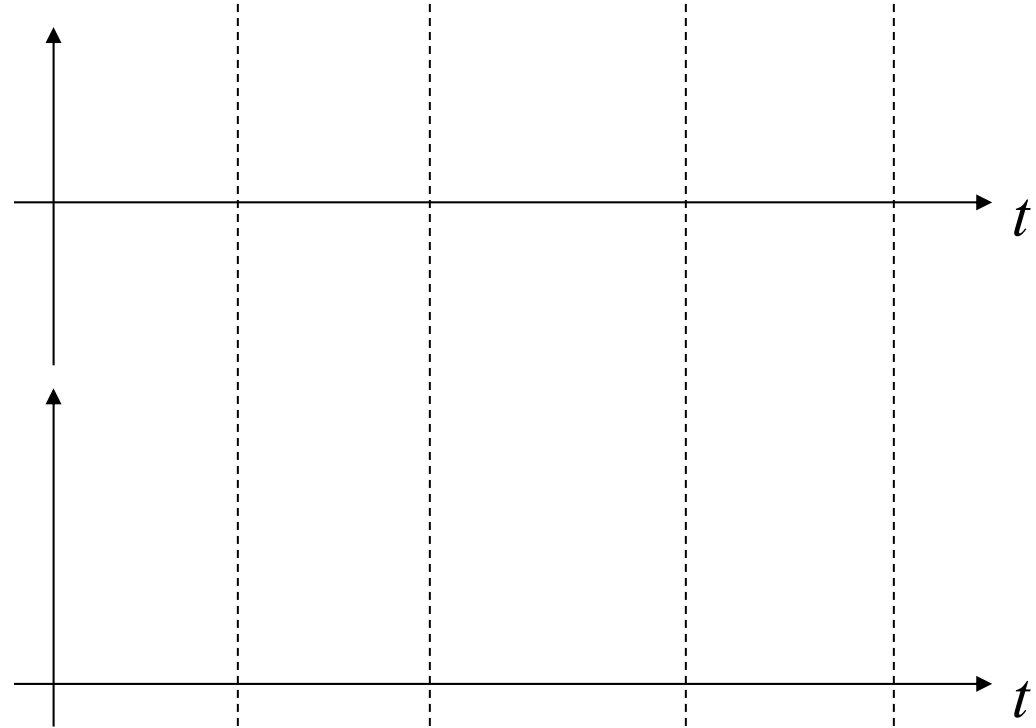
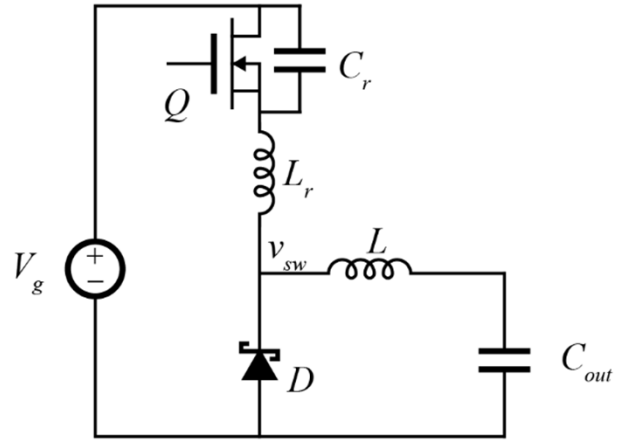
Q : current-bidirectional (e.g. MOSFET)

D : current-bidirectional synchronous rectifier
(e.g. MOSFET)

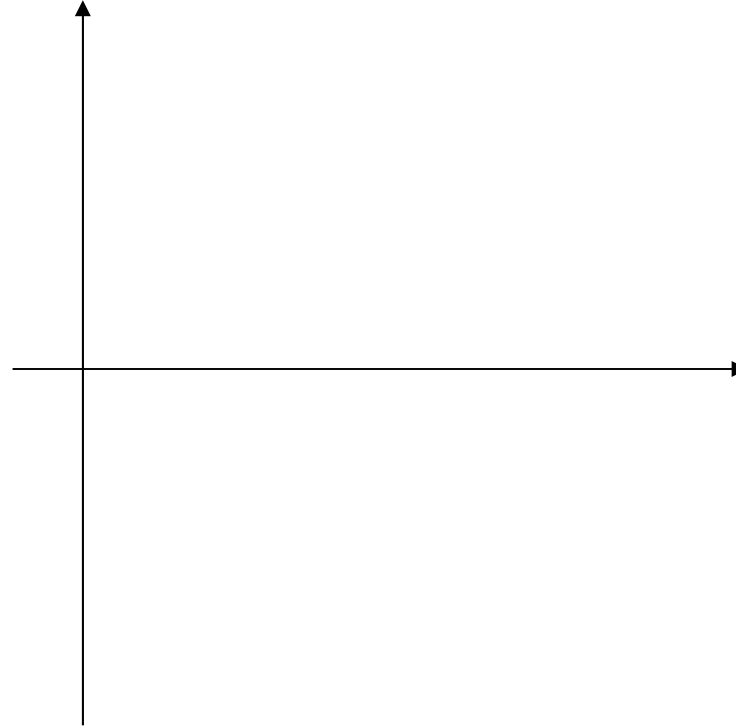
Classification of Resonant-Switch Converters



ZVS-QR Buck



ZVS-QR State Plane



Averaging



Complete Solution

