Remaining Switching Losses

Idealized Switching Waveforms
Class-E Amplifier

Fig 2—Schematic of a low-order Class-E amplifier.

N. O. Sokal, “Class-E RF Power Amplifiers,” 2001

Class $\Phi_2$ Inverter

Fig 3—Actual transistor voltage and current waveforms in a low-order Class-E amplifier.

J. M. Rivas, O. Leitermann, Y. Han, A. D. Sagneri, and D. J. Perreault, “A High-Frequency Resonant Inverter Topology With Low-Voltage Stress”, 2008
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)
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Classification of Resonant-Switch Converters