Example 3: ZVS-QSW Boost Converter

Bidirectional drivetrain boost converter in electric vehicles
- $P_o = 12.5$ kW
- $f_s = 100$ kHz
- $V_{SW} = 250$ V
- $V_o = 500$ V
- $F = 0.5$

Goals:
- Find $L_r, C_r$ to achieve ZVS for all operating points
- Sketch small-signal model for control design
- Solve $G_{vd}(s)$

IGBT vs. MOSFET

Rohm, "New Hybrid MOS Combines the Best Characteristics of MOSFETs and IGBTs. Improved energy savings"
ZVS-QSW Boost
ZVS-QSW Boost

Switch Conversion Ratio
Boost SSM

PWM Converter Transfer Functions