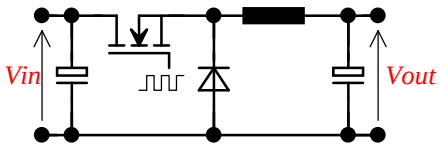
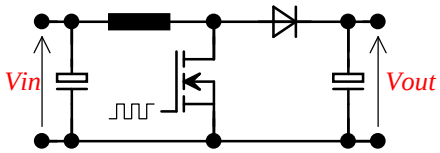
Overview: Switch mode power supplies



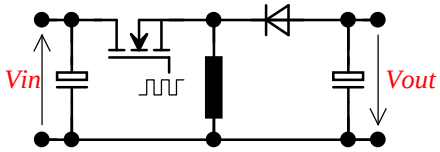
Buck converter

- $V_{out} \leq V_{in}$
- short-circuit and no load proof simply achievable
- V_{GS} has to float
- Usage: Repacement of analoge voltage regulators



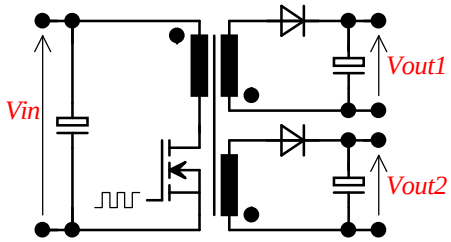
Boost converter

- $V_{out} \geq V_{in}$
- Not short cicuit proof
- Not no load proof if not operating in a closed loop
- Usage: Battery supplied devices as notebooks, mobilphones, camera flashesPhotoblitze



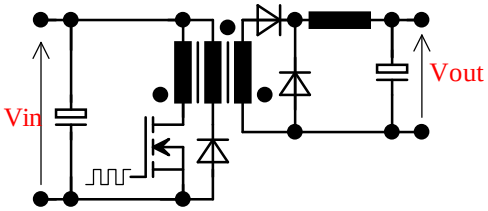
Inverting converter

- $V_{out} < 0V$
- short-circuit proof simply achievable
- Not no load proof if not operating in a closed loop
- usage: Achieve of a negative voltage out of a positive



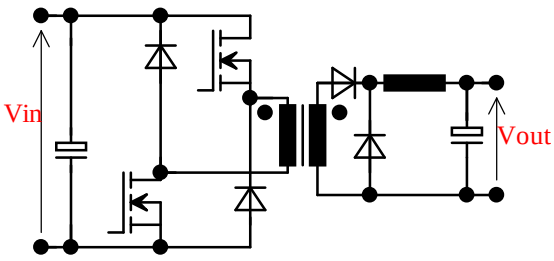
Flyback converter

- Several, isolated output voltages, regulated by one control circuit, achievable
- Power up to some 100W
- Wide range for input and output voltage (mains voltage 85...270VAC achievable)
- Transistor breakdown voltage $V_{DS} \geq 2V_{in}$
- Very good magnetic coupling necessary
- Big core with air gap necessary



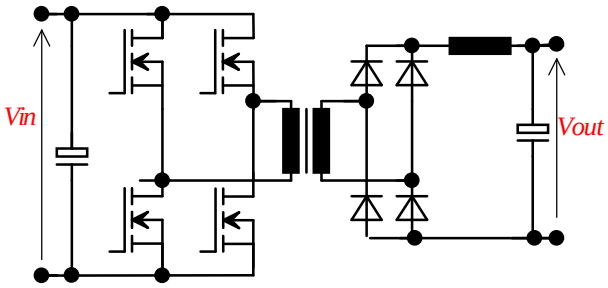
Single transistor forward converter

- Only one output voltage
- Output power up to several 100W
- Transistor breakdown voltage $V_{DS} \geq 2V_{in}$
- Duty cycle $\frac{t_{on}}{T} \leq 0,5$
- Very good magnetic coupling necessary
- Small core without an air gap



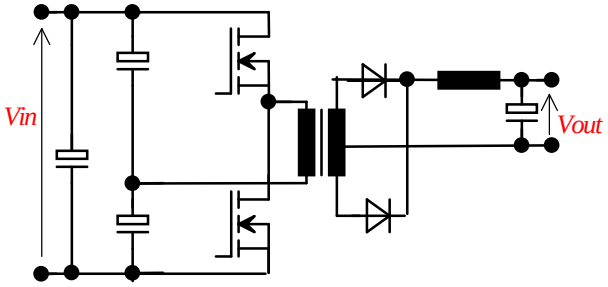
Two transistor forward converter

- Only one output voltage
- Output power up to some kW
- Transistor breakdown voltage $V_{DS} = V_{in}$
- Duty cycle $\frac{t_{on}}{T} \leq 0,5$
- Small core without an air gap
- Not an extaordinary magnetic coupling necessary



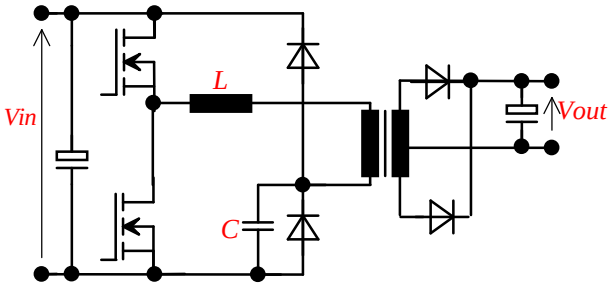
Full-bridge push-pull converter

- Only one output voltage
- Output power up to many kW
- Transistor breakdown voltage $V_{DS} = V_{in}$
- Small core without an air gap
- Not an extaordinary magnetic coupling necessary
- Balancing problems



Half-bridge push-pull converter

- Only one output voltage
- Output power up to some kW
- Transistor breakdown voltage $V_{DS} = V_{in}$
- Small core without an air gap
- Not an extaordinary magnetic coupling necessary
- Balancing problems



ZCS push-pull resonant converter

- Several, isolated output voltages achievable
- Output power up to several kW
- Transistor breakdown voltage $V_{DS} = V_{in}$
- Small core without an air gap
- Not an extaordinary magnetic coupling necessary
- Control with fixed pulse duration and variable frequency
- If the output power is low compared with the rated power, the frequency can be audible