

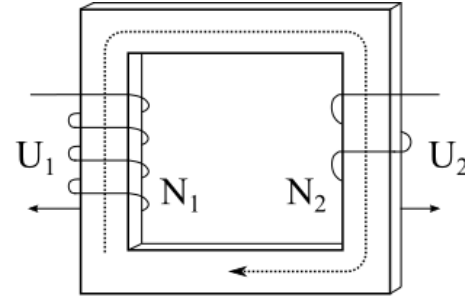
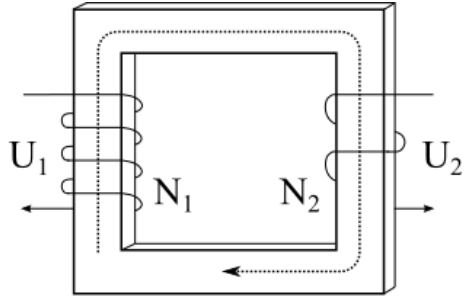
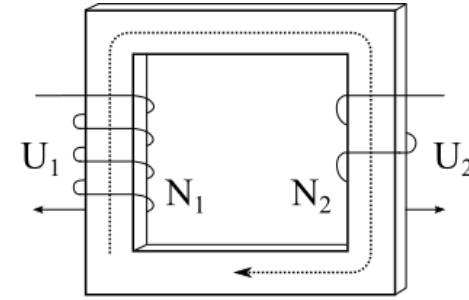
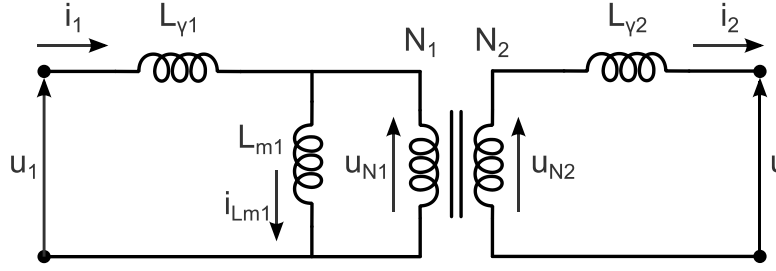
ISOLATED POWER SUPPLIES

-continued-

DC POWER SUPPLY

Isolated (DC) power supplies - Concept

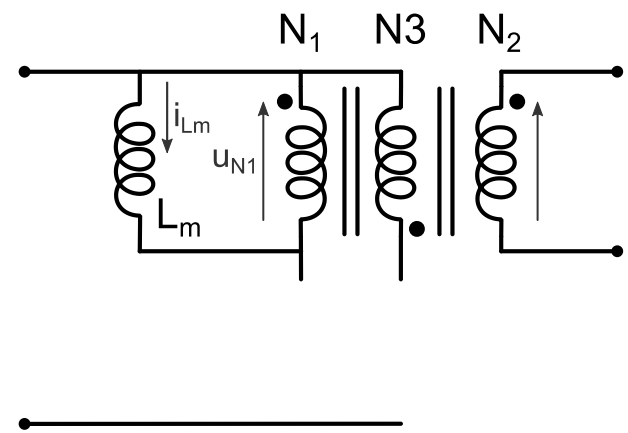
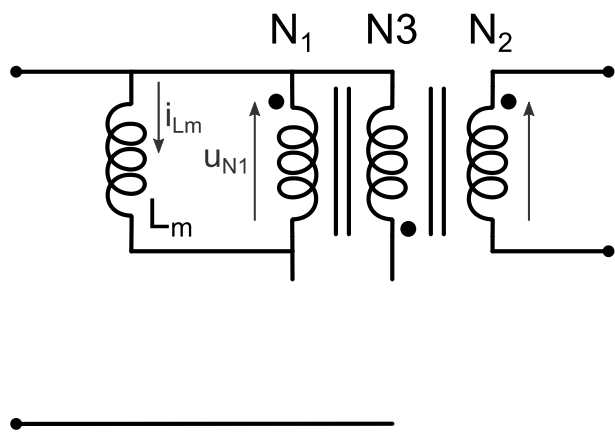
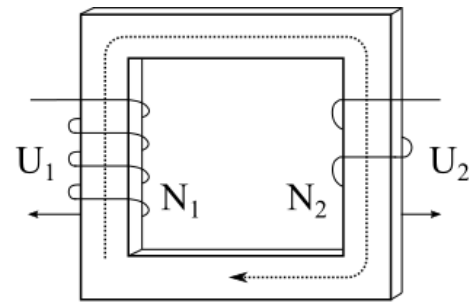
High-frequency transformer



DC POWER SUPPLY

Isolated (DC) power supplies - Concept

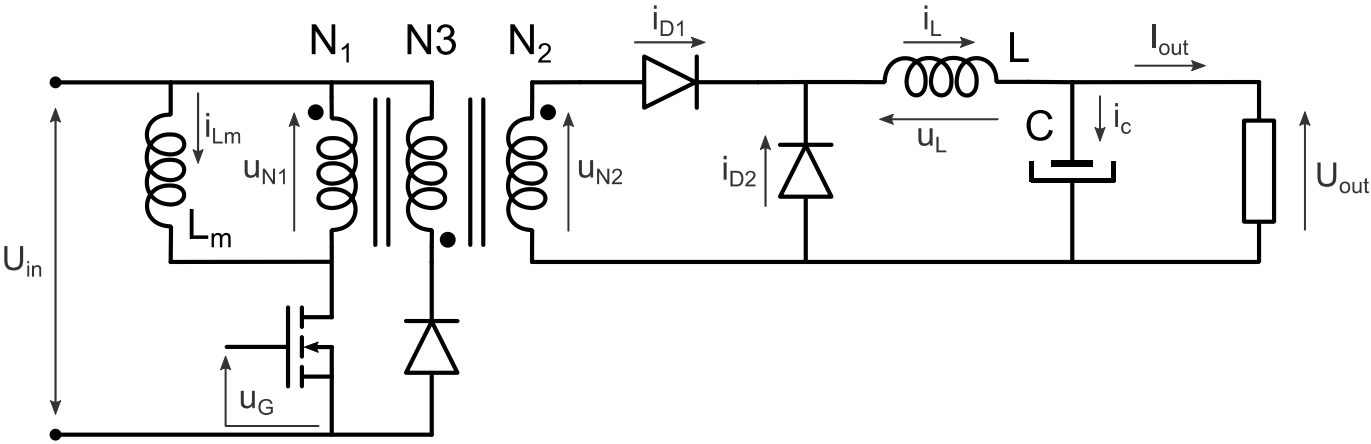
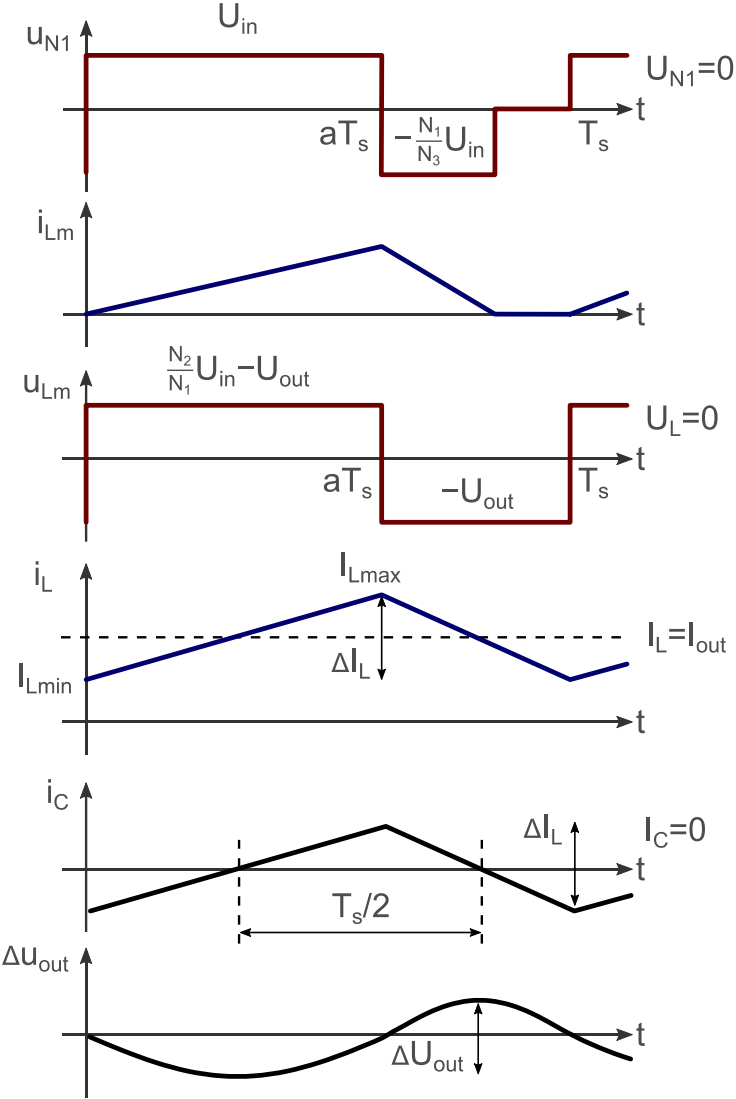
Forward (transformer)



DC POWER SUPPLY

Isolated (DC) power supplies

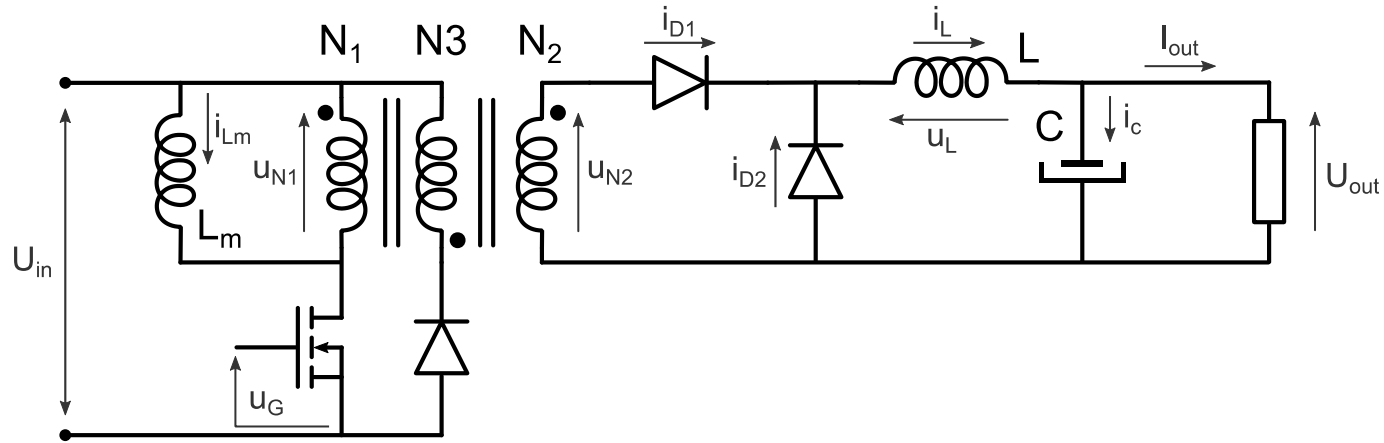
Forward converter



DC POWER SUPPLY

Isolated (DC) power supplies

Forward converter



- Voltage “turns ratio”:

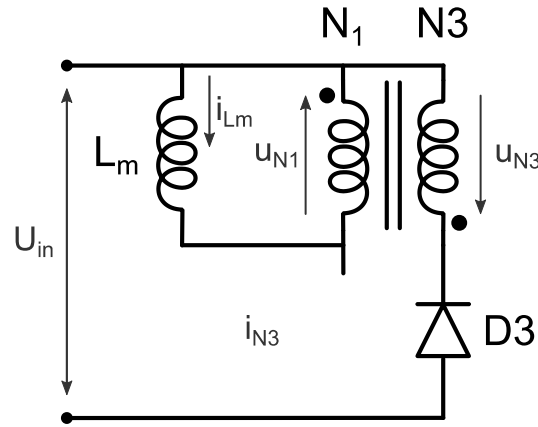
$$U_L = 0 \Rightarrow \left(\frac{N_2}{N_1} U_{int} - U_{out}\right) \cdot a T_S = U_{out} \cdot (1 - a) T_S$$

$$\Rightarrow \frac{U_{out}}{U_{in}} = \frac{N_2}{N_1} a$$

DC POWER SUPPLY

Isolated (DC) power supplies

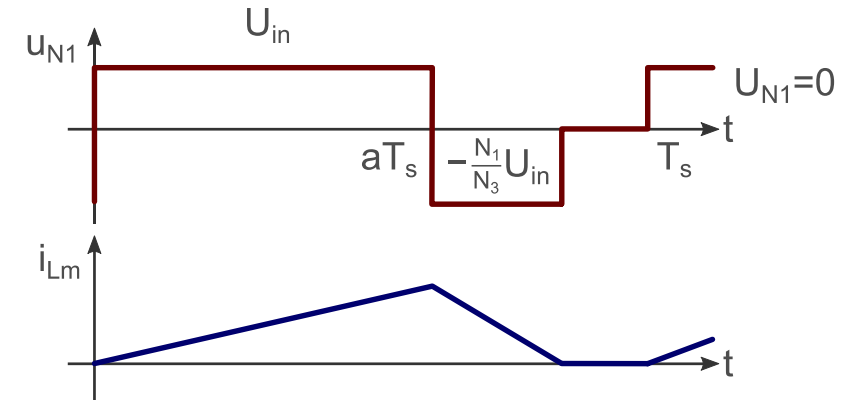
Forward converter



$$i_{N3} = \frac{N_1}{N_3} i_{Lm}$$

$$u_{N3} = -U_{UL}$$

$$u_{N1} = -\frac{N_1}{N_3} U_{in}$$



- Duty cycle limitation - a_{max}

$$U_{N1} = 0 \Rightarrow U_{in} \cdot a_{max} T_S = \frac{N_1}{N_3} U_{in} \cdot (1 - a_{max}) T_S$$

$$\Rightarrow a_{max} = \frac{N_1/N_3}{1 + N_1/N_3}$$

$$N_1 = N_3 \Rightarrow a_{max} = 0,5$$

$$N_1 = 2 \cdot N_3 \Rightarrow a_{max} = 2/3$$

$$N_1 = 1/2 \cdot N_3 \Rightarrow a_{max} = 1/3$$