

Buck-Boost Converter

The **buck-boost converter** converts a positive input voltage to a negative output voltage.

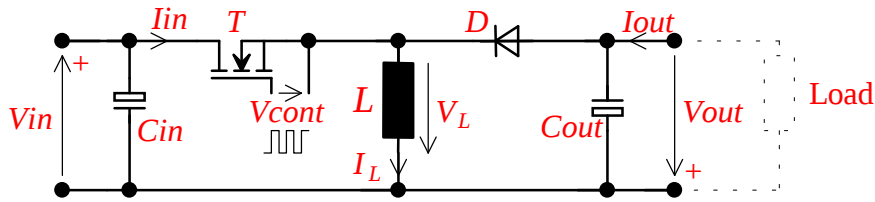


Figure 1.3.1: Buck-Boost converter

Fig 1.3.1 shows the basic circuit of the buck-boost converter. The transistor T works as a switch, which is turned on and off by the pulse-width-modulated voltage V_{cont} . During the on-time of the transistor, the inductor current I_L increases linearly. During the off-time the current I_L continues and charges the output capacitor C_{out} . Note the polarity of the output voltage in Fig 1.3.1.

For the continuous mode and steady state conditions the output voltage is given by:

$$V_{out} = V_{in} \frac{t_1}{T - t_1}$$

The inductor current I_L is given by:

$$\bar{I}_L = I_{out} \frac{T}{T - t_1} = I_{out} \left(\frac{V_{out}}{V_{in}} + 1 \right) \quad \text{and} \quad \Delta I_L = \frac{1}{L} V_{in} t_1 = \frac{1}{L} \cdot \frac{V_{in} V_{out}}{V_{in} + V_{out}} \cdot \frac{1}{f}$$

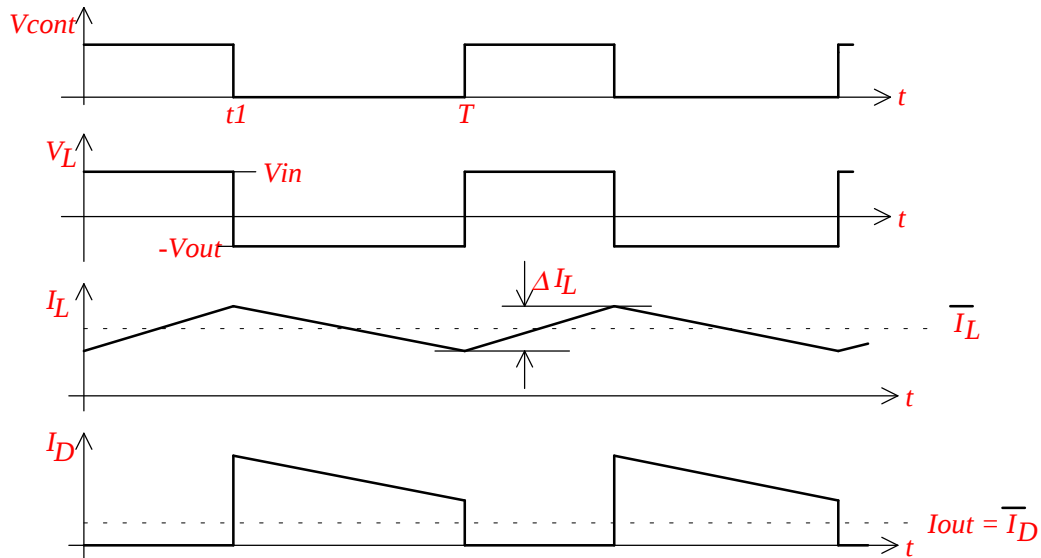


Figure 1.3.2: Voltages and currents of the buck-boost-converter