

# CASPOC 2003

*A Simulation Experience*

Power Electronics Example Package

**90+ Examples with questions**

**Questions and remarks**

- Load example: **FULLB\_1.CSI**. Start the simulation. In this circuit the capacitor  $C_3$  is omitted.
- What happens if the average of  $V_{L1}$  is unequal to zero.
- Place a capacitor in series with the primary winding of the transformer as indicated in the figure, by loading the file **FULLB\_2.CSI**, and notice the difference in the voltage across the inductor  $L_1$ .
- Calculate the average  $V_{L1}$ .
- Calculate the output voltage as function of the input voltage.
- Calculate the value of  $C_3$ . Note that the switching frequency must be higher the resonant frequency,  $f_s > f_0$ .

$$f_0 = \frac{1}{2\pi \sqrt{\left(\frac{N_p}{N_s}\right)^2 * L_f * C_3}} \Rightarrow C_3 = \frac{1}{4\pi^2 * f_0^2 * \left(\frac{n_p}{n_s}\right)^2 * L_f}$$

Educational  
Power Electronics  
Simulation & Animation  
Examples

Fast & Easy!

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# Power Electronics Example Package

Explore the world of Power Electronics and Electrical Drives using Caspoc. This Educational Example Package contains more than 90 preprogrammed examples of Power Electronics simulations for CASPOC. The examples include schematic, printed simulation results and educational questions and remarks on the example.

## *1-PHASE RECTIFIERS*

1-phase diode rectifier  
1-phase diode rectifier with inductive load  
1-phase thyristor  
1-phase diode bridge rectifier  
1-phase half-controlled symmetrical bridge  
1-phase half-controlled asymmetrical bridge

1-phase thyristor rectifier bridge  
1-phase triac converter

## *3-PHASE RECTIFIERS*

3-phase one sided thyristor bridge  
3-phase half-controlled symmetrical bridge  
3-phase thyristor bridge  
3-phase diode bridge  
3-phase triac converter

## *DC-DC CONVERTERS*

boost converter  
buck converter  
buck-boost converter  
2-quadrant converter  
cuk converter  
conventional chopper  
bipolar switching dc-dc converter  
unipolar switching dc-dc converter

## *RESONANT CONVERTERS*

series resonant circuit  
parallel resonant circuit  
voltage-source series resonant converter  
current-source parallel resonant converter  
single-ended resonant dc/dc converter  
resonant converter below the resonant frequency  
resonant converter above the resonant frequency  
series-loaded resonant converter  
series-loaded resonant con. below resonant frequency  
series-loaded resonant con. above resonant frequency  
parallel-loaded resonant converter  
parallel-loaded resonant con. below resonant freq.

parallel-loaded resonant con. above resonant freq.  
zero-current-switching, quasi-res buck converter  
zero-current-switching, quasi-res boost converter  
zero-voltage-switching, quasi-res buck converter

## *SWITCH MODE DC POWER SUPPLIES WITH ISOLATION*

forward dc/dc converter  
flyback dc/dc converter  
flyback parallel converter  
forward 2 transistor dc/dc converter  
flyback 2 output dc/dc converter  
flyback 2 transistor dc/dc converter  
current-source dc-dc converter  
push-pull converter  
full-bridge circuit  
half-bridge circuit

## *DC TO AC INVERTERS*

1-phase GTO DC-to-AC inverter  
1-phase parallel inverter  
1-phase current source inverter  
mc Murray inverter  
current-source inverter  
voltage-source inverter  
*AC/AC CONVERTERS*  
dc-link converter with current storage  
dc-link converter with voltage storage  
dc-link converter with energy storage  
6-pulse cycloconverter

## *TRANSFORMERS*

1-phase transformer  
triangle to star transformer  
star to triangle transformer  
star to triangle transformer  
triangle to triangle transformer

## *DRIVES*

direct current machine  
direct current machine with chopper drive  
induction machine  
current-source inverter with induction machine  
voltage-source inverter with induction machine  
*CIRCUIT WITH CONTROLLER*  
switching of two capacitors  
forward converter-feedback compensation  
1-phase LC filter  
3-phase LC filter  
1-phase thyristor-controlled inductor for static var control  
3-phase thyristor-controlled inductor for static var control  
3-phase switch-mode static var controller  
1-phase active filter  
1-phase sinusoidal input current rectification  
1-phase switch mode for a bidirectional powerflow  
3-phase vector diagram  
equivalent series resistance  
second order system  
diode snubber circuit  
RMS and average calculation  
flyback converter with voltage/current mode control  
*BUCK CONVERTER WITH CONTROLLER*  
buck current-mode control  
buck current/voltage-mode control  
buck P-I control  
buck hysteresis control  
buck converter with diode bridge and pwm controller  
buck converter with diode bridge and amplitude mod.  
buck converter with pwm controller

The Power Electronics Example package is included in the Educational Version in electronic form. A printed version can be ordered additionally.

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