

AC high-voltage power supply for plasma cell

Development of an AC high-voltage power supply with adjustable frequency and amplitude

Graduate



Alex Martin Köppel



Benjamin Erni

Introduction: INFICON develops innovative measurement and sensor technologies for various high-tech applications. The aim of this work is to develop an AC power supply that makes the existing plasma cell of an optical measuring system usable for higher pressure ranges and enables the determination of optimum operating parameters..

Objective: The main task is to develop an AC high-voltage power supply. The AC power supply is to be used to generate and analyse a plasma with various voltages and frequencies in order to analyse its efficiency. The problem involves generating high-voltage with adjustable amplitude and frequency for a given plasma cell.

The developed circuit is intended to be used as a testbench for the further development of the circuit for a mass production product. The adjustable operating parameters allow the plasma cell to be operated over a wide range of frequencies and voltages.

Requirements:

- Input voltage: 24 V
- Output voltage: 600 V to 2'500 V
- Frequency: 1 kHz to 28 kHz

Various solutions and topologies are to be analysed, evaluated, and simulated for the implementation of the AC power supply. The developed circuit is to be tested and validated.

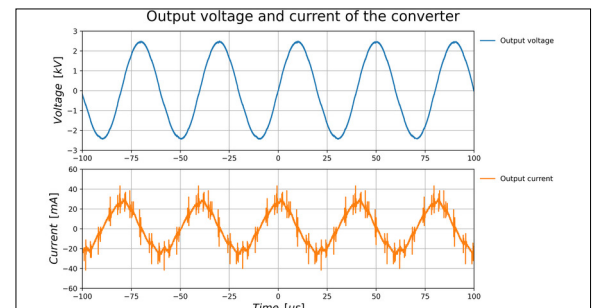
Result: The work delivers a functional AC power supply that meets the requirements and enables the plasma cell to be operated in the new pressure range and allows the operating parameters to be adjusted. Protective measures prevent damage caused by

overcurrent and overvoltage of the device. The developed software enables communication with the circuit over USB and displays the operating parameters on the built-in display.

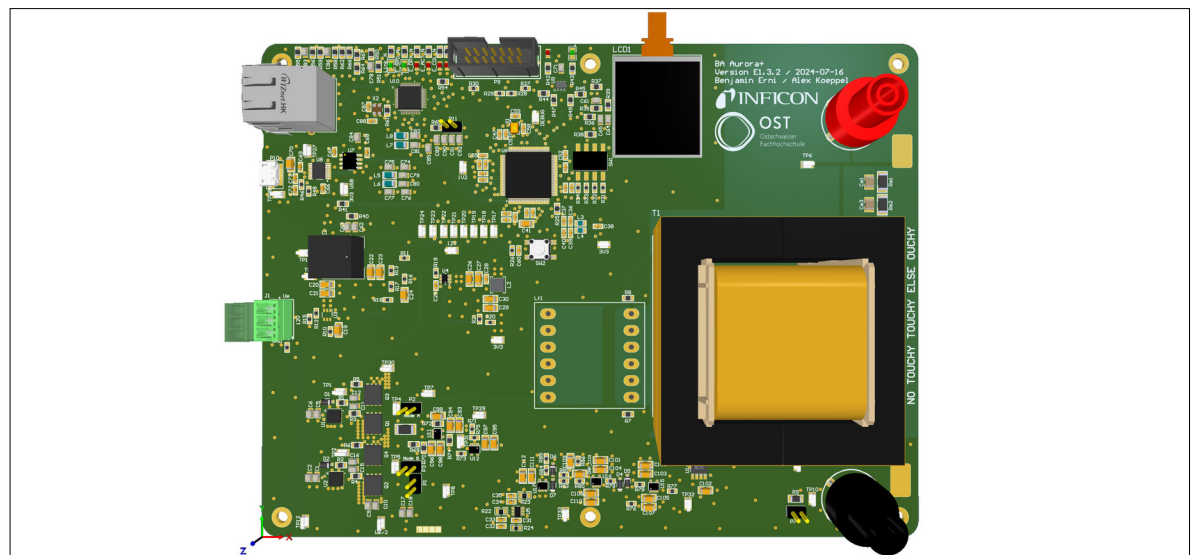
Optical plasma vacuum gauge
INFICON AG



Output voltage and current of the converter
Own presentation



PCB of the AC high-voltage power supply
Own presentation



Advisor
Simon Nigsch

Co-Examiner
Prof. Adrian Weitnauer

Subject Area
Electronics and Control
Engineering