

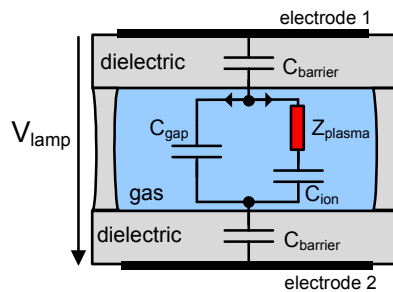
Driving of Dielectric Barrier Discharge Lamps with a Pulsed Transformer-less Full-bridge Topology

High frequency, high efficiency pulse mode operation made possible

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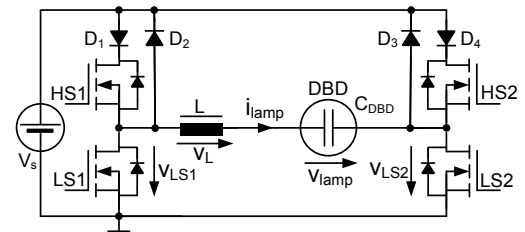


Dielectric Barrier Discharge (DBD) Lamps



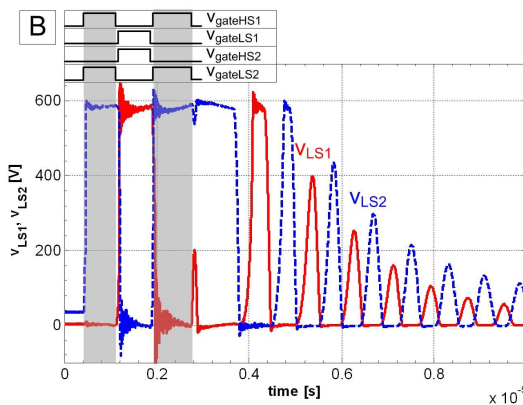
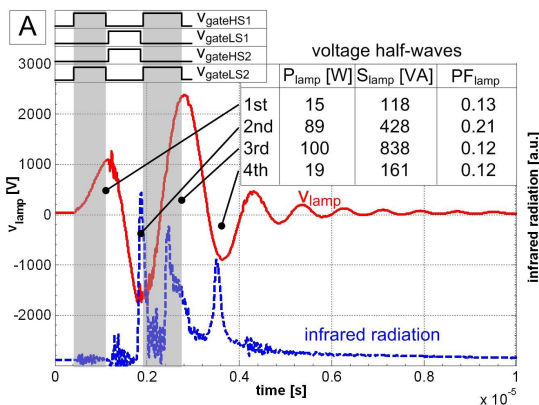
- capacitive load, low power factor (PF)
- ignition voltage in kilovolt-range
- bipolar pulse required for homogeneity and efficiency

Schematic and key features

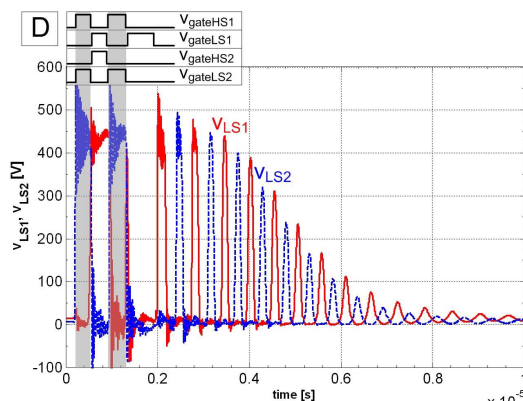
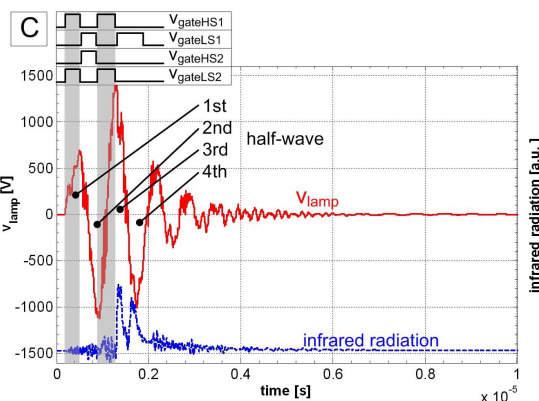


- voltage step-up by multiple resonant up-swings
- transformer omitted: no parasitic parallel resonance, no magnetic reset requirement, very high pulse frequency
- requirement of high voltage supply & switches

Experimental waveforms – 500 kHz and 1.15 MHz operation



- $T_{rep} = 40 \mu s$
- $V_s = 600 V$
- $f_{pulse} = 500 kHz$
- $P_{lamp} = 228 W$
- $PF_{lamp} = 0.14$
- $\eta_{ECG} > 92 \%$



DBD parameters

- $A_{lamp} = 0.2 m^2$
- $C_{lamp} = 4.77 nF$
- $V_{ign} = 1.8 kV$
- $E_{lamp} = 4.3 \mu J$

- $T_{rep} = 40 \mu s$
- $V_s = 450 V$
- $f_{pulse} = 1150 kHz$
- $P_{lamp} = 195 W$
- $PF_{lamp} = 0.20$
- $\eta_{ECG} > 80 \%$