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## Characterization of Compact Short Pulse Power Supply for Non-Thermal Plasma Discharge Applications

There is resurgent of interest in the development of high voltage, short pulse, fast rise time and high frequency modulators for the generation of uniform and diffuse plasma in the dielectric barrier discharge (DBD) based non-thermal plasma (NTP) sources useful for potential biological, medical, surface modification, food, agriculture, sterilization, etc. [1-2]. The DBD based non-thermal plasma sources are effectively a capacitive load where breakdown occurs in the gas gap. It has been found that a high voltage, high frequency and short pulse power modulator (SPPM) is required to generate the efficient plasma for DBD devices. In this paper, an effort has been made to design and develop a high frequency, high voltage SPPM. The development excludes primary side RCD clamping circuits while it has been incorporated in secondary side to discharge the stored capacitive energy. This eliminates the sinusoidal oscillations caused by interaction between NTP load capacitance and leakage inductance of the transformer. This makes the HV-SPPM more compact, simple and light-weight for efficient plasma generation. The designed SPPM is capable of generating voltage 10 kV (max), frequency 50 kHz, pulse duration  $<1\mu\text{s}$ . The paper has also discussed the design and characterization issues of the SPPM and its utilization for the generation of NTP at different operating and geometrical conditions.

[1] S. K. Rai, A. K. Dhakar and U. N. Pal, 'A Compact Nanosecond Pulse Generator for DBD Tube Characterization', Rev. Sci. Instrum. 89, 033505, 2018.

[2] N. N. Misra, O. Schluter and P. J. Cullen, 'Cold Plasma in Food and Agriculture-Fundamental and Applications', Academic Press, Elsevier, U.K., 2016.

### Optional: Student Paper Competition

### Optional: Interested in Job Opportunity

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