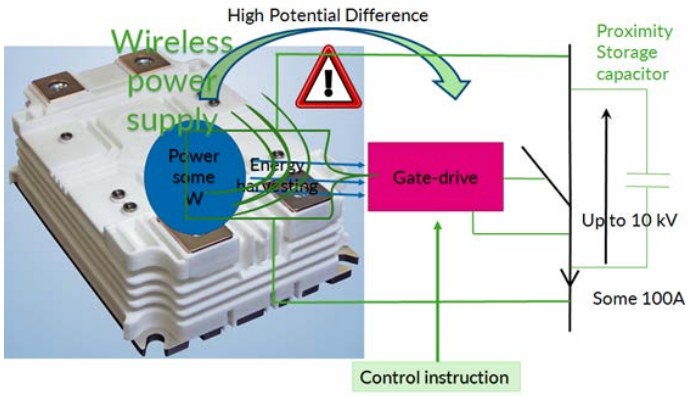
Power supply of close gate drive controller for new high voltage power converters

CONTEXT

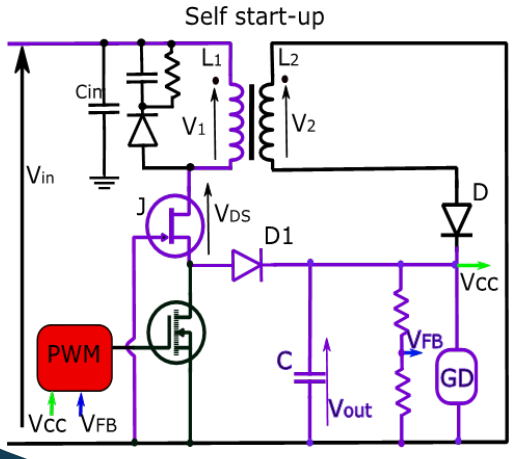
The new high-voltage power converters and the facilities for the transmission networks very often use several switches with different floating potentials. In addition, the new trend is the use of power modules with higher voltage ratings (up to 10 kV) to reduce the number of components per system. To develop reliable converters, particular care must be given to the design of new control cards and their power supplies. The high voltage levels encountered pose new challenges for this design. The goal is to design the gate drive power supply of the main switch which is at a floating level. This power supply must take into account insulation problems and must be able to provide the power required to properly power the gate-drive to a floating potential.



TECHNOLOGY DESCRIPTION

The proposed circuit is based on a "Flyback" type architecture, incorporating the self-starting principle of the power switch control circuit. This topology has a high voltage conversion ratio between the input voltage and the output voltage.

The proposed architecture guarantees a supply voltage of 24 VDC with a variable output power of 1W up to 20W, from an input voltage of up to 2kVDC. An evolution of the design could be studied in the case where different levels of input voltage or output power would be needed.



APPLICATION DOMAIN

Medium voltage and high voltage DC grids, especially for the integration of renewable energy sources into MVDC grids.

ADVANTAGES

- Easy integration on power module ratio DC/DC converter
- Cost effective

TRL SCALE

1 2 3 4 5 6 7 8 9

Proof of concept by simulation results and experimental results on mock-up

DELIVERABLES

Prototypes
Calculation & simulation report
Thesis: Gate-drive power supply for new high voltage power electronics converters

"Electronic board produced, Dimensions ~ 10 cms x 5 cms. Circuit with self-starting principle, fixed switching frequency and variable duty cycle. 60% efficiency at 20W, 2kV input / 24VDC output."

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