Abstract

A solid state switching system is presented which is designed as high reliable, long life, low maintenance product for short repetitive and high di/dt pulses. The solid state switch uses specially designed semiconductor devices with integrated fast triggering circuits which are powered by one closed loop current source power supply. Blocking voltages of over 5 kV are possible by stacking several devices in series connection. For charging the capacitor, the switch mode power supply to charge the capacitor up to 5kV is designed. The capacitor bank of Trench France which can offer capacitance of 160uF is used. The solid state system has no environment restriction and can be used in any position. The design of modular, robust, high-current switch for controlling discharge current in the large plasma device and pulse power application is presented. SCRs are connected in parallel to provide 10 kA current carrying capacity with di/dt 1000A/sec. Associated snubber and protection circuits are described in detail. The switch is typically operated at a 20 kHz repetition rate. It has proven quite reliable. This type of switch has not just an application in such a plasma source, but can also be used to switch large currents for a variety of applications like defense, missile launching etc. Using this switch, 2000 J energy can be discharged inside the small plasma focus which has anode diameter 10mm and length 70mm. The design is modular and the switch can be smallest or larger depending on the desired current rating.