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Solid state thyatron replacement switch feasibility

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The CERN CTF3 facility is being used to test and demonstrate key technical issues for the CLIC (Compact Linear Collider). Pulsed RF power sources are essential elements in this test facility. Klystrons at S-band (3GHz), in conjunction with pulse compression systems, are used to power the Drive Beam Accelerator (DBA). Most of the modulators that provide the electrical power to the klystrons use a 'line' type modulator consisting of a resonant charging system to charge a pulse forming network (PFN) up to a maximum voltage of 50kV. The stored energy in the PFN is then discharged at a repetition rate of 50Hz via a pulse transformer using a thyatron switch (model CX1836A from E2V technologies) giving a resultant voltage and current on the klystron of 300kV and 290 A, with a pulse width of 8 μ s at full width half height (FWHH). Pulse rise time is approximately 1 μ s. A 12 stage series connected prototype solid state switching unit (each stage consisting of two parallel thyristors) that can be retro fitted as a replacement for the thyatron in the existing modulators has been built and already tested up to 30kV, 50Hz for initial evaluation. Upcoming tests are foreseen to reach nominal voltage on the klystron in order to complete the evaluation of the feasibility to replace a thyatron by a semiconductor switch technology in a "line" type high power modulator. This paper will describe the results and performance of this switch.

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