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Performance of High Voltage Bipolar Pulse Generator with Fast Push-Pull Solid-State Switch Modules

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Four identical pulse generators (pulsers) provide fast beam deflection in the Low Energy Beam Transport (LEBT) beam chopping system at the Spallation Neutron Source (SNS) Linac. The existing pulsers have become obsolete and need to be replaced to improve overall performance of the chopper system. A new bipolar pulse generator has been designed, and a prototype has been built and tested at the SNS. The generator uses fast push-pull transistor BEHLKE switch modules. It can produce a 1MHz burst of alternate \pm 2.5 kV with adjustable pulse widths during the 1-ms macro-pulse at a burst repetition frequency of 60 Hz with rise/fall times of less than 40 ns into a 100 pF capacitive load. The performance enhancements of this new pulser in comparison with existing and previous versions of the pulse generator are discussed in the paper. The pulser can be used in applications requiring a series of bipolar \pm 3.5 kV pulses, or unipolar pulses of positive or negative polarity with amplitude up to 5 kV and various pulse widths with a minimum of 150 ns. The maximum switching frequency, number of pulses, or burst repetition frequency in burst mode is limited by maximum power dissipation in the switches and other components. The features of this new pulser along with the results of timing control adjustments, timing and temperature measurements, and HV full power testing on the test stand are presented.

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