**Title:** Marx-Type Solid-State Bipolar Modulator Topologies Performance Comparison

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**Abstract:** The operation of generalized Marx-type solid-state bipolar modulators is discussed and compared with simplified Marx-derived circuits, to evaluate their capability to deal with various load conditions. A comparative analysis on the number of switches per cell, fiber optic trigger count, losses, and switch hold-off voltages has been made. A circuit topology is obtained as a compromise in terms of operating performance, trigger simplicity, and switching losses. A five-stage laboratory prototype of this circuit has been assembled using 1200 V insulated gate bipolar transistors (IGBTs) and diodes, operating with 1000 V dc input voltage and 1 kHz frequency, giving 5 kV bipolar pulses, with 2.5 mu s pulse width and 5 mu s relaxation time into resistive, capacitive, and inductive loads.

**Author Keywords:** High-voltage (HV) techniques; Marx generators; Power semiconductor devices; Pulsed power systems

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