Abstracts

Voltage Pulse Forming Dynamics in a Transmission Line Section Employing Photoconductive Charging and Discharging

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Studies are presented of voltage pulse generation by triggering the charge and discharge cycles of a transmission line section using photoconductive switches. A simple theoretical model is used, from which design criteria and optical power requirements are established that enable a) the section to achieve full charge, and b) complete discharge of the section to yield a rectangular pulse with a background voltage level of 5% or less. It is shown that these conditions can be achieved when the ratio of the charging switch and discharge switch peak conductance is approximately equal to the ratio of the line transit time and photoconductor recovery time. With this ratio low, the charging switch length can be increased to improve the bias voltage hold-off characteristics, while the additional optical energy needed is minimal. A formula for the maximum repetition rate is derived that demonstrates significant improvement over devices that employ passive charging. Experimental results on a microstrip device are presented, and are compared to the model predictions.

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