

Abstracts

A Ferroelectric Microwave Switch (Nov. 1965 [T-MTT])

J.W. Amoss, M.R. Donaldson, L.J. Lavedan, A.L. Stanford and J.E. Pippin. "A Ferroelectric Microwave Switch (Nov. 1965 [T-MTT])." 1965 Transactions on Microwave Theory and Techniques 13.6 (Nov. 1965 [T-MTT]): 789-793.

The rapid variation of an admittance shunting a transmission line is a well-known technique for switching microwave power. The application of a switching voltage to a ferroelectric material provides a convenient means for rapidly varying an admittance between significantly different states. A multistub transmission-reflection-type switch actuated by a switching voltage of 1000 volts has been studied. The operation of the switch depends upon the ability of a ferroelectric variable capacitor to change its capacitance upon application of a switching voltage. A change in capacitance represented by a ratio of two to one results in substantial change in the input admittance of the prototype network shunting the transmission line. The prototype network is a shunt stub and is spaced nominally at $\lambda/4$ intervals along the transmission line to form a multistub switch. Each shunt stub includes a ferroelectric variable capacitance which employs lead strontium titanate ($Pb_{0.315}Sr_{0.685}TiO_3$) as the ferroelectric material. Both theoretical and experimental curves of isolation and insertion loss vs. frequency are given for two- and three-stub versions of the switch. For switching voltages of the order of 1000 volts, ferroelectric switches with an isolation of 40 dB, an insertion loss less than 1.0 dB, and a bandwidth of 10 percent are feasible.

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