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Title:Nanosecond laser-driven semiconductor switch for 70 GHz microwave radiation
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Abstract:We study a new type of semiconductor switches for microwave radiation driven by laser emission. The switches comprise a plate of plain semiconductor built in a hollow metallic waveguide resonator. The plate can be illuminated by laser emission changing the resonator properties due to photoconductivity and therefore switching between two stable states. A sample switch has been built and experimentally investigated, demonstrating nanosecond level of switching performance. The results of numerical simulation by the FDTD method are compared with the experimental data. Typical laser pulse energies sufficient for switching are from 1 nJ to 100 nJ, switched radiation frequency tuning range is about 10 % around 70 GHz. The switching operation was observed in wide range of the driving 100-femtosecond laser parameters - for pulse energy from 6 pJ to 250 μJ, and laser emission wavelength from 0.75 μm to 2 μm. © Springer Science+Business Media, LLC 2012.
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