Abstracts

Reduction of leakage currents in silicon mesa devices

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Easily and rapidly manufacturable silicon mesa devices suffer from additional leakage currents from the mesa rim where n-p junctions are exposed to the surface. A modified mesa structure is proposed, which reduces the drawbacks of leakage currents. The structure contains a metallization smaller than the mesa and a very thin (10-nm) contact layer as, for instance, can be grown by molecular beam epitaxy (MBE). The current distribution for a forward-biased junction is given. For cylindrical symmetry, it was possible to derive analytical solutions. At high current densities, the voltages at the mesa edge are effectively reduced and the current contribution of the outer part is only a small fraction of the total current. Numerical examples are given for large test structures as used for microwave IMPATT diodes.

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