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The influence of edge effects on the determination of doping profiles using silicon pad diodes

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Edge effects for square p+n pad diodes with guard rings, fabricated on high-ohmic silicon, are investigated. Using capacitance-voltage measurements of two pad p+n diodes with different areas, the planar and the edge contributions to the diode capacitance are determined separately. Different methods of extracting the doping concentration are compared. In practically all cases it is found that the results with and without edge corrections differ significantly. After edge corrections, the bulk doping determined is uniform within ± 1.5 %. The voltage dependence of the edge capacitance is compared to the predictions of two simple models. It is recommended that pad diodes of different dimensions, ideally both circular and square, should be implemented as standard test structures for sensor submissions.

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