DESIGN AND FABRICATION OF SEMICONDUCTOR POWER DEVICES,
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Power transistors have found applications in various industries varying from automotive to defense. The Insulated Gate Bipolar Transistor (IGBT) is a device widely used for high power electronic applications and was selected for this study. This device has bipolar current flow and a MOS gate thus combining advantages of both the Double diffused MOS (DMOS) and power bipolar junction transistor. Prototypes consisting of transistors with varying densities, gate lengths and gate widths were fabricated to characterize these devices Attempts were made to study the effect of field oxide thickness on breakdown voltage. Photomask were designed in mentor graphics. Process was designed to obtain required power rating. The design was simulated using commercial software ATHENA to verify the process conditions. The IGBTs were fabricated on 4" high resistivity n-type wafers. The IV characteristics obtained for both the DMOS and IGBT exhibit field effect. However this field effect is found to be in parallel with a parasitic conductance and limits the transistor from turning off. It is also observed that the devices are operational as depletion mode devices instead of enhancement mode devices.