

Carrier Concentrations in Degenerate Semiconductors Having Band Gap Narrowing

Atanu Das^a and Arif Khan^b

^a Department of Physics and Techno Physics, Vidyasagar University, Midnapore 721 102, West Bengal, India

^b Electrocom Corporation, P. O. Box 60317, Potomac, Maryland 20859-0317, USA

Reprint requests to A. K.; E-mail: a.khan123@yahoo.com or akhan@electrocom-corp.com

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The density-of-states effective mass approximation and the conduction-band effective mass approximation are employed to formulate carrier concentrations and the diffusivity-mobility relationship (DMR) for heavily doped n-semiconductors exhibiting band gap narrowing. These are very suitable for the investigation of electrical transport also in heavily doped p-semiconductors. Numerical calculations indicate that the DMR depends on a host of parameters including the temperature, carrier degeneracy, and the non-parabolicity of the band structure.

Key words: Degenerate Semiconductors; Band Gap Narrowing; Kane's Model; Diffusivity-Mobility Relationship.