Abstracts

Effect of Temperature on Device Admittance of GaAs and Si IMPATT Diodes

Y. Takayama. "Effect of Temperature on Device Admittance of GaAs and Si IMPATT Diodes." 1975 Transactions on Microwave Theory and Techniques 23.8 (Aug. 1975 [T-MTT]): 673-680.

The effect of temperature on the small-signal admittance of IMPATT diodes with uniformly doped and high-low doped (Read) structures is investigated experimentafly and theoretically. Small-signal admittance characteristics of X-band Si p+-n-n+, GaAs M-n-n+ (Schottky-uniform), and GaAs M-n+-n-n+ (Schottky-Read) IMPATT diodes are measured at various junction temperatures for different dc current levels. Small-signal analysis is performed on GaAs IMPATT diodes of uniformly doped and high-low doped structures, and the calculated results on temperature dependence of the device admittance are compared with the experimental results. Reasonable agreement is found between theory and experiment. It is shown that GaAs IMPATT diodes are superior to Si diodes in admittance temperature characteristics and that the uniformly doped structure has a small admittance temperature coefficient in magnitude, compared to the high-low doped structure. It is also shown by calculation that the admittance temperature coefficient of a punch-through diode is small in magnitude, compared to that of a non-punch-through diode.

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