Abstracts

Temperature Distribution in Cylinder Symmetric mm-Wave Devices

A general solution of the nonlinear heat equation for temperature dependent thermal conductivity has been developed in cylinder coordinates. The solution is helpful in the design and analysis of high frequency power devices and circuits. The application to diamond heatsinks leads to a design rule height of diamond /spl ap/ 0.5 x radius of diamond. Coplanar circuits with an active device modeled as a focal plane can be analyzed. Due to the temperature dependent thermal conductivity the thermal resistance becomes dependent on the input power. Especially for small radii of the focal plane and large input powers significant deviations from the approximation "constant thermal conductivity" result. The results are used to calculate the maximum current density of monolithically integrated transit time devices. The comparison with experimental results yields a rather good agreement.

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