

Closed-form Analytical Thermal Model for Accurate Temperature Estimation of Multilevel ULSI Interconnects

Ting-Yen Chiang and Krishna C. Saraswat

Department of Electrical Engineering, Stanford University, Stanford, CA 94305
{tychiang, saraswat}@stanford.edu

Abstract

This paper presents a compact analytical model for estimating the temperature rise of multilevel ULSI interconnects incorporating via effect. Significant difference in temperature distribution and maximum temperature rise is observed between the realistic situation of heat dissipation with vias and the overly simplified case that ignores via effect. The closed-form expression is further applied to evaluate the impact of the interconnect heating on the various design rule parameters and scaling of deep sub-micron Cu/low-k interconnects.