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TEMPERATURE CONTROL OF HIGH POWER MICROPROCESSOR

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ABSTRACT

Active control of the die-level temperature is desirable during production testing of high power microprocessors, so as to ensure accurate performance classification. The analysis in this research demonstrates fundamentals limits of temperature control for typical devices under test conditions. These limits are identified for specified control power to die power ratios. The effects of test sequence deign and device package design on the temperature control limits are also examined. The theory developed can be applied to any thermal control problem where a conductive medium separates the control source from the location where control is desired. As a dimensional example, when the die power density ($Q_d = 10\ W/cm^2$) and frequency of the die power variation ($\omega = 10\ HZ$) with ($\Delta T = 4K$), the required control power density ($Q_c = 63\ W/cm^2$). This performance is much better than for ideal temperature control where the control magnitude was found to be ($173\ W/cm^2$) with no change with the convective heat transfer coefficient f t when it varies from $500\ W/m^2.K$ to $2000\ W/m^2.K$.

Keyword: Thermal control, Microprocessors, Temperature control, Power density

السيطرة على درجة الحرارة للمعدات الالكترونية ذي القدرة العالية

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الخلاصة

السيطرة على درجة حرارة مادة المعالج الالكتروني مهمة جدا" خلال عمليات الإنتاج والفحص للتحقق من دقة الأداء. التحليل الرياضي في هذا البحث، يستخدم أساسيات انتقال الحرارة لسيطرة على درجة حرارة معدات الكترونية نموذجية تحت الفحص.