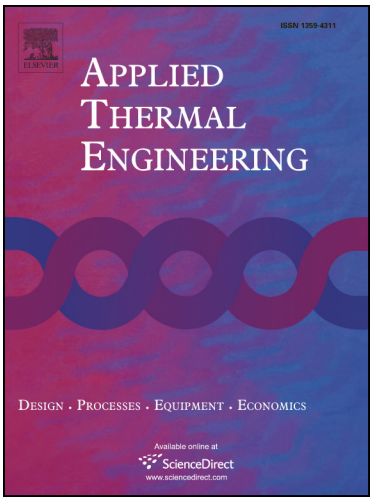

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PII: S1359-4311(17)34339-9
DOI: https://doi.org/10.1016/j.applthermaleng.2017.12.101
Reference: ATE 11622

To appear in: *Applied Thermal Engineering*

Received Date: 30 June 2017
Revised Date: 24 December 2017
Accepted Date: 26 December 2017

Please cite this article as: H-L. Chen, C-C. Wang, Analysis and experimental verification of weight saving with trapezoidal base heat sink, *Applied Thermal Engineering* (2017), doi: https://doi.org/10.1016/j.applthermaleng.2017.12.101

Analysis and experimental verification of weight saving with trapezoidal base heat sink

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Abstract

A quick weight saving with trapezoidal base heat sink applicable for electronic cooling application is studied analytically, numerically, and experimentally. The conventional heat sink with rectangular base can be modified into trapezoidal base for material saving. A differential equation capable of describing the temperature distribution of the trapezoidal base is derived and its closed-form analytic expression is derived. It is found that three parameters r_A (ratio of effective surface area to the base area), r_d (ratio of chip lateral length to the base length) and h^+ (modified convection heat transfer coefficient) play pivotal roles in balancing the material saving and the performance loss. When r_d = 0.1, the material saving for r_t = 0.6 is about 18%; while the corresponding performance loss is 2.93%. When r_d = 0.2, the material saving for r_t = 0.6 is about 16%; while the corresponding performance loss is 2.47%. The analytical results are verified with experiments with good agreement.

Keywords

Heat sink; Analytical solution; Rectangular base; Trapezoidal base; material saving

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