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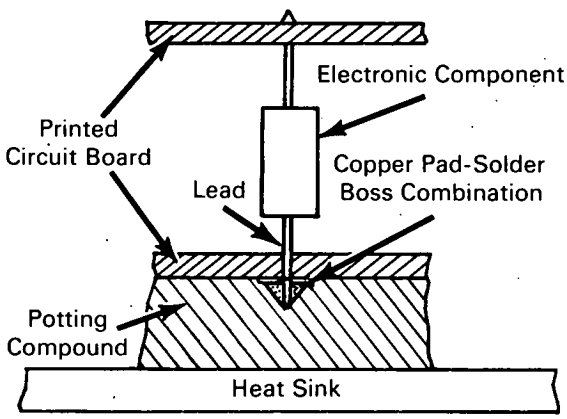
NASA TECH BRIEF

Thermal Resistances of Solder-Boss/Potting Compound Combinations



Formulas have been derived for calculating the thermal resistance of solder-boss/potting compound combinations, for different depths of a solder boss, in electronic cordwood modules. In such modules, electronic components are connected vertically between two printed circuit boards, and the complete assembly is attached to a heat sink, which conductively removes heat generated in the electronic components. Conduction of the electronically generated heat is through the component leads to the lower solder boss, and then through the potting compound to the heat sink. The rate of heat conduction to the heat sink is a function of the respective thermal resistances of the electronic component, the lead/solder-boss combination, and the potting compound. The thermal resistance of the electronic component may be determined empirically, and the thermal resistance of the lead/solder-boss combination in the module is negligible. The solder boss (plus copper pad) essentially acts as a buried heat source (hot spot) which may be at varying depths in the potting compound. Since the solder boss is the heat source for the potting compound, its shape and position will affect the thermal resistance of the surrounding potting compound. Tests using a number of potting compounds (consisting of resins thoroughly mixed with filler materials) have shown that this is the case. The derived formulas can be used as a design tool to calculate the thermal resistances of the combination for depths of the solder boss varying between 0.020 and 0.050 inch.

Note:

Complete details may be obtained from:

Technology Utilization Officer
Manned Spacecraft Center
Houston, Texas 77058
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Patent status:

No patent action is contemplated by NASA.

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Category 01