Abstracts

Effects of Coefficient of Thermal Expansion Mismatch on Solder Attached GaAs MMICs

J. Pavio and D. Hyde. "Effects of Coefficient of Thermal Expansion Mismatch on Solder Attached GaAs MMICs." 1991 MTT-S International Microwave Symposium Digest 91.3 (1991 Vol. III [MWSYM]): 1075-1078.

An evaluation/qualification was undertaken to examine reliability effects of GaAs solder attachment to a variety of different materials with a diverse range of coefficients of thermal expansion (CTE). Failure mechanisms included fractures or cracks through the devices as well as cracking of the corners. GaAs devices placed under tensile stress with materials such as Kovar (CTE 5.1 ppm/°C) experienced severe cracking and corner fracture through long term reliability screening. Devices placed under compressive stress, on the other hand, did not degrade through life testing unless the CTE mismatch was greater than or equal to 16.5 ppm/°C. From this evaluation, a coefficient of thermal expansion range was defined at which GaAs can be reliably attached and expected to operate without failures through 1000 cycles of MIL-STD thermal cycling.

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