

高温動作に対応したサンドイッチ型ワイヤボンドレス SiC パワーモジュールの作製技術

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Fabrication of Wire Bond-Less SiC Power Module with Sandwich Structure for High Temperature Device Operation

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Abstract

A wire bond-less SiC power module with sandwich structure is proposed for use in high-temperature devices. The module is composed of two SiC-transistors and two SiC-diodes, which are sandwiched between two ceramic circuit boards. The devices are bonded on the circuit boards using a sintered material (submicron Au paste) with a precise alignment (within $\pm 5 \mu\text{m}$) and height control (within $\pm 7 \mu\text{m}$). These two circuit boards are soldered with Au-12%Ge solder, resulting in a structured sandwich module within a tilting level of $15 \mu\text{m}/11\text{-mm-substrate}$. No damage is observed on the devices and internal connections in the module even after 500 cycles of a thermal cycling test ($-40^\circ\text{C}\sim 250^\circ\text{C}$).

Key Words: Sandwich Structured SiC Power Module, Sandwich Structure, Wire Bond-Less, High Temperature Operation, Submicron Au Paste, Au-12%Ge Solder