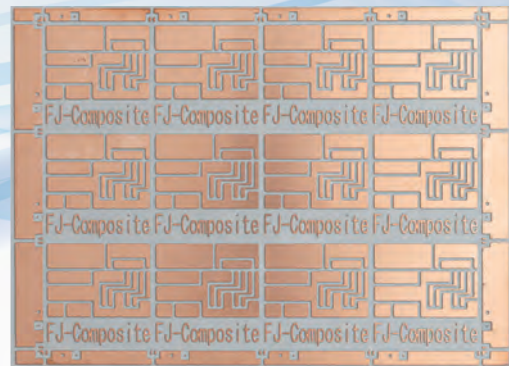


S-DBC Sputtering – Diffusion Bonding Circuit

Ceramic insulated circuit board

This is an ideal circuit board for power semiconductors. It is manufactured using our proprietary sputtering and diffusion bonding technology, which can minimize voids at the joint interface that are typically unavoidable in the AMB method. Notably, it exhibits strong bonding even under high power conditions, while also possessing excellent heat dissipation capabilities.



Characteristics

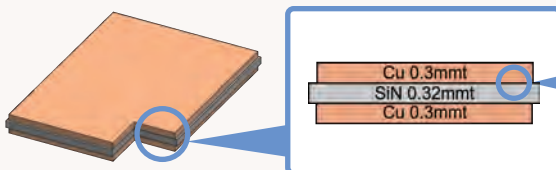
Sputtering and diffusion bonding technology achieves high bonding strength.

Sputter deposition of titanium

Since silver brazing material is not used, silver migration to copper does not occur, so there is minimal alloy layer at the interface between copper and ceramics in this bonding process.

Diffusion bonding by a vacuum hot press equipment

Uniform joint surface achieved by vacuum diffusion bonding.

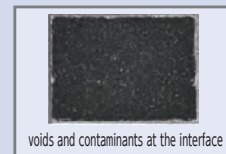
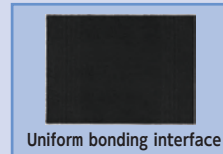


Bonding interface

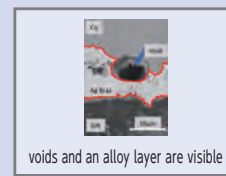
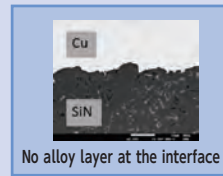
S-DBC method by FJC

AMB method by the competitors

Overhead view by the SAT test



Cross-section view by a microscope



Various shape processing technologies

Our technology is applicable to both nitride-based and oxide-based ceramics.

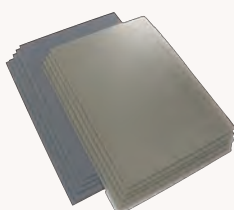
[conventional]AMB process: Nitriding only, DBC process: oxidation only

Asymmetrical joining

By bonding copper with different thicknesses on the upper and lower surfaces of ceramics, warping of the bonded substrate after circuit etching is suppressed. This technology can manage copper plates up to 2.00 mm in thickness.

Supply chain

Raw material



Partnership with ceramic suppliers.

Mass production



bonding/etching,

automated production system by robots, establishment of an etching production line

Inspection/delivery



to perform reliability evaluation tests in-house, thermal shock test, SAT test



Creating the Future

FJ Composite

S-DBC Sputtering – Diffusion Bonding Circuit

Reliability Assessment [Thermal cycle test (TCT)]

Evaluate conditions

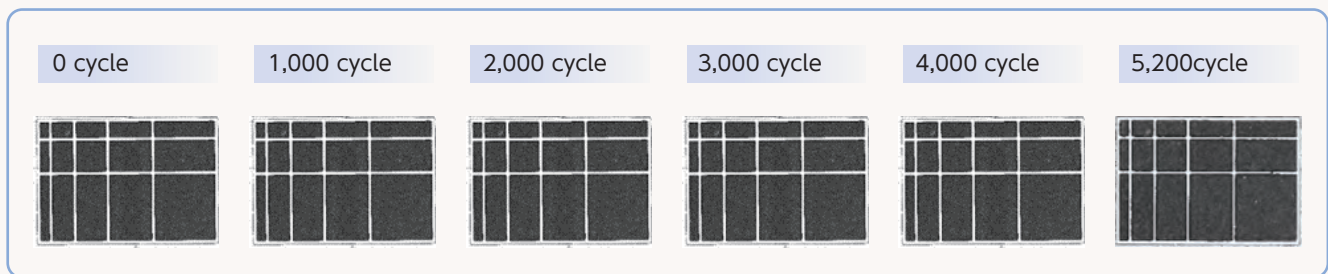
- -55°C and 150°C / cycle (15min)
- Transition time: 20s

Results

- -55°C and 150°C / 5000 cycle
- Pass by the users

Comparison every 1,000 cycle

At more than 5,000 cycles, no delamination or failure was observed, and the joint exhibited robust strength.



Application

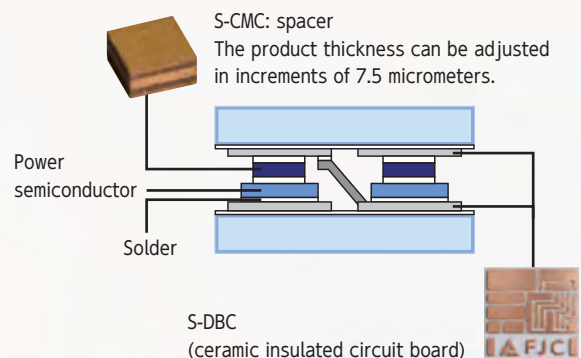
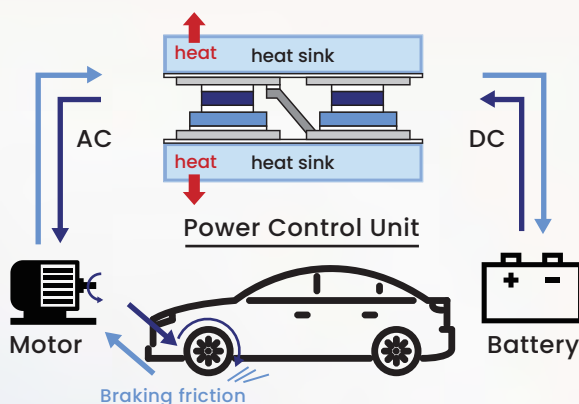


Mass production System

Low production cost

Power module for electric vehicles (Power control unit)

- S-DBC is also used in double-sided cooling power devices.
- On a copper circuit, semiconductors and various components are bonded, exhibiting efficient heat dissipation.



JQA-QMA16308

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