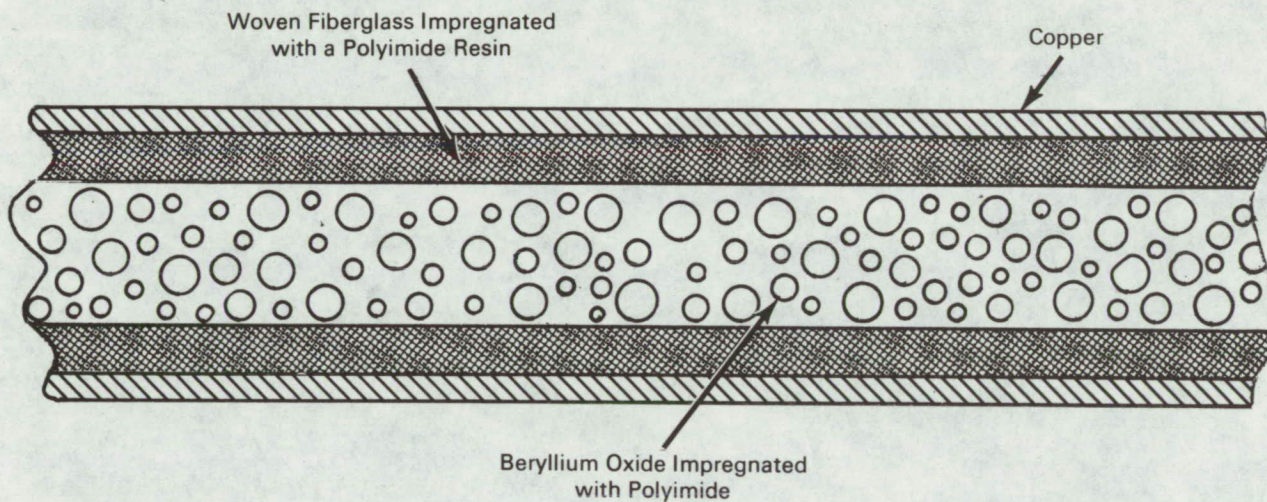


NASA TECH BRIEF



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A New Low-Expansion Nonflammable Printed Circuit Board



The problem:

Thermal mismatch between a printed circuit board and the electronic component leads and other materials mounted on it causes stresses which crack solder joints during thermal cycling. The cracked solder joints may cause circuit failure.

The solution:

A printed circuit board which has a thermal coefficient of expansion similar to that of the component leads. High-expansion composite materials are sandwiched between the outer layers of copper and woven fiberglass.

How it's done:

The fiberglass cloth is impregnated with a polyimide resin and heated until the resin is tack free. Layers of the fiberglass and composite materials are then laminated in a platen press to form an integrated assembly consisting of six or more layers (depending

on the desired thickness) and cured at 700° C until complete polymerization has occurred. A printed circuit board, representative of this scheme, is shown in the figure and has a thermal coefficient of expansion of 17×10^{-6} over a temperature range of -50° C to +150° C. Previously used printed circuit boards had a coefficient of 51×10^{-6} . The new board has a thermal coefficient of expansion equal to the leads of the electronic components, possesses mechanical and electrical properties similar to epoxy fiberglass, and is nonflammable in a 200 psia oxygen environment.

Note:

No additional documentation is available. Specific questions, however, may be directed to:

Technology Utilization Officer
Marshall Space Flight Center
Huntsville, Alabama 35812
Reference: B70-10154

(continued overleaf)

Patent status:

This invention is owned by NASA, and a patent application has been filed. Royalty free, nonexclusive licenses for its commercial use will be granted by NASA. Inquiries concerning license rights should be made to NASA, Code GP, Washington, D.C. 20546.

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