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Marshall Space Flight Center



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A New Packaging and Testing Concept For Microelectronic Components

The problem:

Discrete microelectronic components are individual parts such as resistors or transistors that are used in hybrid integrated microcircuits. Because discrete components are handled and tested individually, they get knocked about a good deal more than integrated circuits. Many packaging methods do not protect the parts well during shipping and unpacking, and the act of testing (especially when they must be put onto a test board) frequently damages or contaminates the parts.

The solution:

With a new packaging technique, the parts are securely held on a sealed, printed circuit board that is both a package and a test fixture. The parts can be handled, stored, and tested in the sealed package. In this way they are thoroughly protected right up to the moment of use.

How it's done:

The parts are mounted on a printed circuit board. One side of the board has machined guide pockets for placing the parts and has slots for the contact springs. On the reverse side, an etched conductor pattern connects the contact springs to contact points and to the edge connector used in testing.

The contact springs provide an electrical connection between the discrete parts and the etched circuit. The springs are chemically milled from beryllium copper sheets. The mounted part is protected by a cover that is fitted into a recess in the board and sealed with an O-ring. It is attached by four screws.

The board may be designed to accommodate various types of devices. Presently, designs are available for leadless inverted devices (LID's), ceramic channel carriers, six-contact dual channel carriers, and two-terminal passive devices. Up to eight dual-channel carriers or twelve passive devices can be mounted on one board.

The components are loaded at the manufacturing plant where the package can be filled with dry nitrogen, sealed, and kept sealed during testing, burn-in, and storage. To test or burn-in the parts, the sealed carrier is merely plugged into an edge connector attached to the appropriate test circuits. To unload the parts for use, only a small screwdriver and tweezers are needed. The cover is unscrewed, the spring depressed, and the part removed from its slots.

This packaging concept has been extensively used with excellent results. It has led to a negligible failure rate on hybrid assemblies when the parts are tested and burned-in. The concept itself could be used for almost any discrete component, and large production runs with molded or stamped parts should lead to a low packaging cost.

Note:

Requests for further information should be directed to:

Technology Utilization Officer
Marshall Space Flight Center
Code A&PS-TU
Marshall Space Flight Center, Alabama 35812
Reference: B73-10109

Patent status:

Inquiries concerning rights for the commercial use of this invention should be addressed to:

Patent Counsel
Marshall Space Flight Center
Code A&PS-PAT
Marshall Space Flight Center, Alabama 35812

Source: G. L. Filip and S. V. Caruso
Marshall Space Flight Center
(MFS-20936)

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