

Masking for Conformal Coatings

Conformal coatings are regularly employed to protect the surface of a soldered printed circuit board assembly (PCBA) from moisture, chemicals in the PCBA's service environment, and foreign objects or debris. Conformal coatings are nonconductive and therefore cannot be placed on any location where electrical contact will be required, such as connector pins, test points, and sockets. Conformal coatings are also not permitted on any mechanical interface location, such as mounting holes or brackets, to assure the proper fit between items in the final assembly. In order to apply conformal coatings to an assembly and comply with the restrictions on keep-out areas, masking is employed to protect those surfaces.

There are two basic strategies for masking of conformal coatings. The first strategy is to use a temporarily installed material that prevents conformal coatings from bonding to locations that forbid coating application. Polyimide tape can be used as a temporary masking agent. The tape must be cut to the proper shape to ensure the tape only covers the area where conformal coatings are not desired. Polyimide tape has a few basic advantages as a masking material. The first advantage is that polyimide tapes are able to withstand a typical oven cure cycle for conformal coatings without damage. Another major advantage is that polyimide tapes have a resistance to tearing that exceeds many other types of adhesive tapes, which allows easy removal after the coating has been cured. Tapes can be cut and formed to cover very precise areas on an assembly. A final advantage is that the assembly is ready for coating immediately after tape is applied.

Another type of temporary masking material is commonly referred to as a "peelable mask" (Figure 1). These products are marketed as a means to quickly and easily mask areas to prevent the flow of solder or conformal coatings during assembly. These materials are dispensed to the area where coating is not desired and left to cure. Some peelable masks can cure at room temperature while an oven cure cycle can be used to cure or accelerate cure of some materials. These materials have a very low adhesion to the surface and can be peeled off when required with very little residue remaining on the assembly. A disadvantage of peelable masks is the cure time required after application.



Figure 1: Peelable mask products are a temporary means to quickly and easily mask areas to prevent the flow of solder or conformal coatings.

A final type of temporary masking material is plugs or caps. Plugs are used to protect the inner cavity of a connector that cannot be coated and are designed to have a snug fit inside the connector housing, covering all pins or contacts inside the connector. Caps are placed over a connector to prevent any coating from contacting the connector and should fit snugly around the outside surface of a connector housing. The plugs and caps are manufactured from materials that can withstand the temperatures required for the oven cure of conformal coatings. The plugs and caps are removed after the coating has been cured and can be reused on subsequent assemblies. An

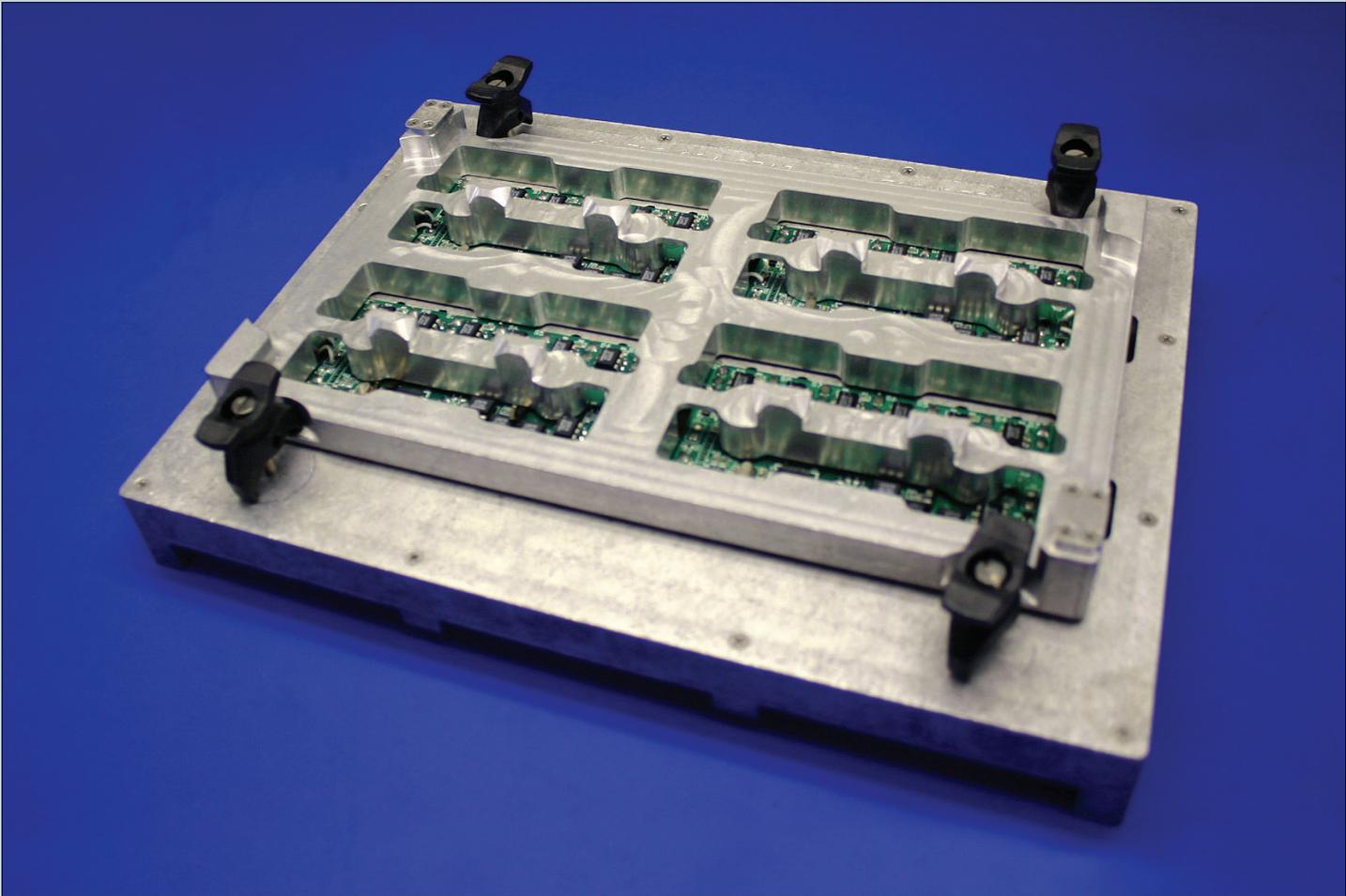


Figure 2: Masking fixtures are designed to mask all areas of an assembly that cannot have coating applied and are designed specifically for the assembly in question.

advantage of plugs and caps is their low cost, especially when considering the many times they may be reused. A significant disadvantage is that plugs and caps can typically only be used on the specific item it is designed to cover, so many different types of plugs or caps may be required if a variety of parts require masking from conformal coatings.

The second basic strategy for masking an assembly is to implement purpose-built masking fixtures (Figure 2). These fixtures are designed to mask all areas of an assembly that cannot have coating applied and are designed specifically for the assembly in question. The major advantage for a fixture is the short time required to apply as compared to applying

tape, peelable mask, or plugs. The major disadvantage of fixtures is that they can require significant upfront investment and may require modification or redesign every time the design of the PCBA is changed.

Masking is a common requirement for processes that apply conformal coatings to PCBAs. A variety of techniques exist for masking a PCBA and ACI can assist manufacturers in determining the best technique for each process. For assistance with masking, conformal coatings or any other electronics manufacturing questions, contact the Helpline at 610.362.1320 or email helpline@aciusa.org.

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