

Technical Bulletin

Common failure mechanisms in conformal coating: Pinholes, Bubbles and Foam

In conformal coating, there are several mechanisms that cause failure of printed circuit boards (PCBs). In a series of technical bulletins SCH will examine the common failure mechanisms in conformal coating including capillary flow, delamination, cracking, loss of adhesion, de-wetting, corrosion, orange peel, pinholes, bubbles and foam.

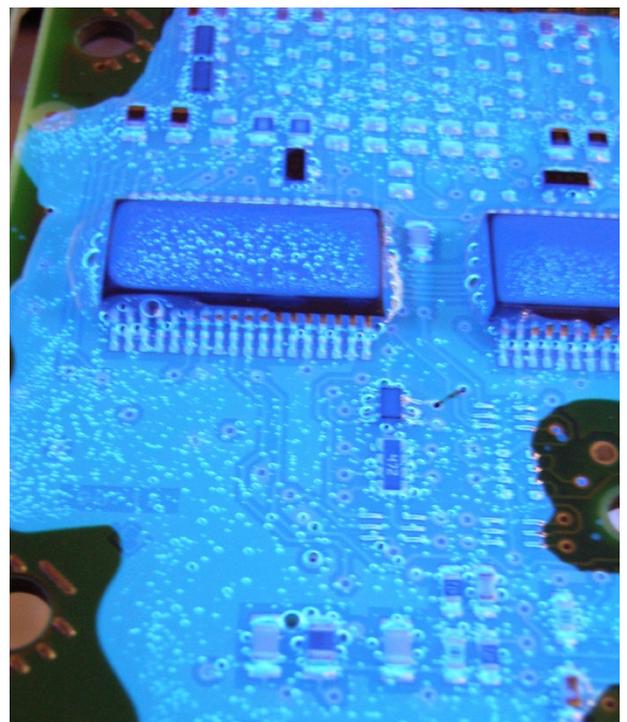
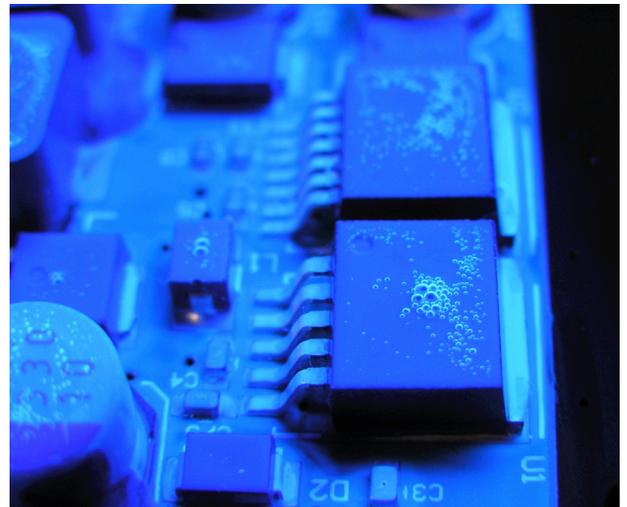
Definition

Bubbles are trapped pockets of air under coating, pinholes are burst bubbles that reach to the surface of the PCB and foam is extreme bubbling.

Causes of pinhole, bubbles & foam in Conformal Coating

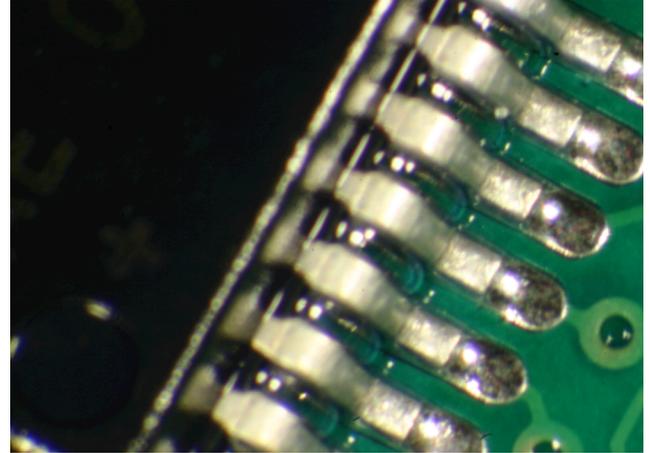
Factors that can cause these effects include:

1. When applying the conformal coating the wet film surface can skin over, entrapping solvents under the surface that can bubble or burst out.
2. If the coating is applied too thick or too viscous any bubbles that are created in the process of application can become entrapped in the coating before they settle out.
3. Air entrapped under components by the coating process can be forced out during the drying / curing process and cause bubbles.
4. Pressure pots with conformal coating inside can absorb air that can manifest as champagne bubbles when applied.
5. Brush coating with too viscous a material or working the coating can cause bubbles.
6. Incorrect spray equipment or pressures can cause excessive bubbles & foam.



How to stop Bubbles in Conformal Coating

1. When applying the conformal coating ensure the wet film surface is not too thick. This is particularly important when spray coating. It is better to apply multiple thin layers than one thick layer. Also, check curing in case elevated temperature is causing the conformal coating to skin.
2. Bubbles becoming entrapped in the coating before they dissipate because too thick a layer is applied can be prevented by applying thinner individual layers and allowing a flash off time between coats.
3. To avoid air entrapment under PCB components try (1) dipping slower into the conformal coating dip tank (2) adding a dwell time to allow penetration of the coating or (3) using a lower viscosity version of the conformal coating to under fill the area more effectively.
4. When using pressure pots with conformal coating inside try to avoid leaving the pots pressurised for long periods of time when not being used or avoid running the pressure pots more than 50% full and letting them stand. This will minimise the champagne effect in the coating.
5. When brush coating try to blend the coating so it flows easily and “flow” the material onto the PCB. Do not work the coating into the PCB as it creates bubbles.
6. Incorrect spray equipment or pressures can cause excessive bubbles & foam.



Examples of bubbles in conformal coating

SCH Technologies offer

- Conformal coating Subcontract Services
- Global supply of Conformal Coating Application Equipment
- Conformal Coatings
- Conformal Coating Training courses
- Conformal Coating Consultation & troubleshooting

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