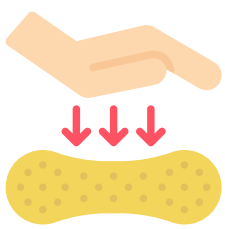
Epoxy Conformal Coatings

Conformal coatings are applied to printed circuit boards (PCBs) to protect them from environmental stress such as salt, corrosion, humidity, and moisture, mitigate tin whiskers, and provide a barrier to electrically insulate components. A wide variety of conformal coating types are available, each with their own strengths and weaknesses.

Epoxy-based coatings are usually two-part systems with limited pot life. Similar to polyurethanes, they provide good moisture and chemical resistance. A major downfall is that they are almost impossible to remove chemically for rework.

Strengths

Useful to 150ƒC [302ƒF]

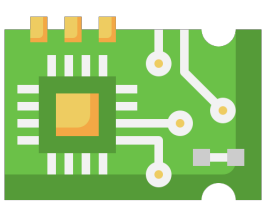


Harder Durometer

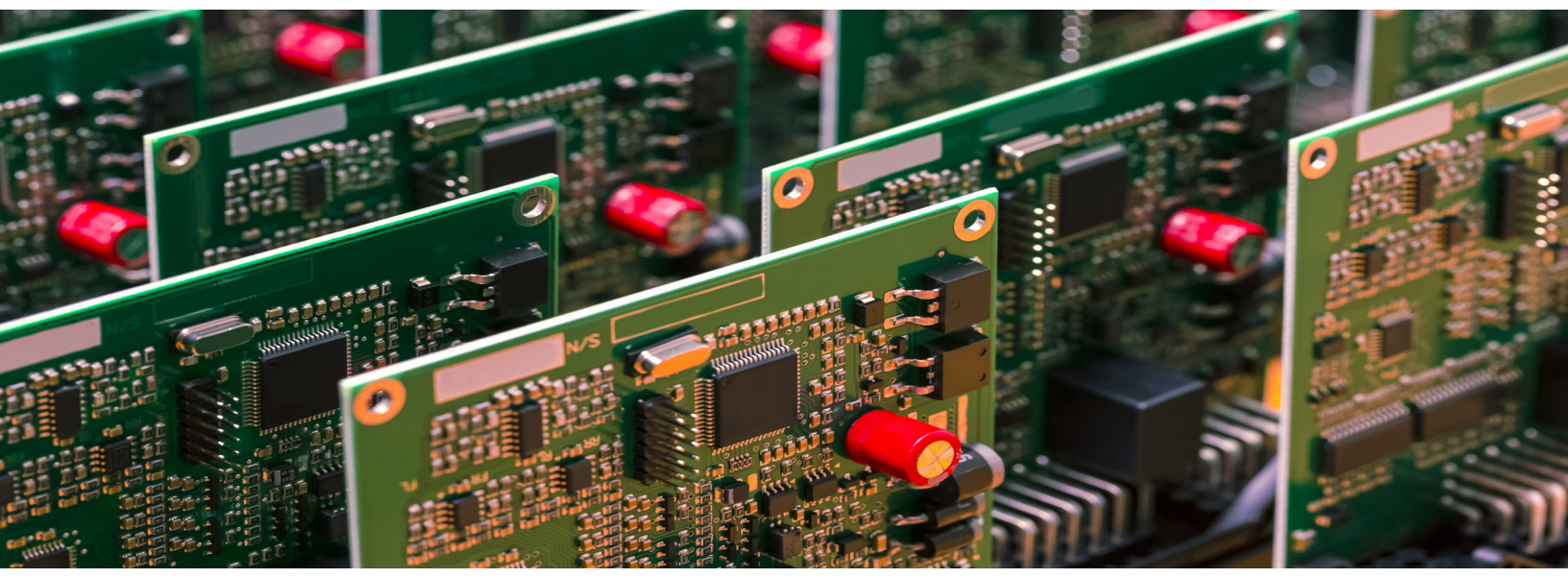
Abrasion Resistance

CTE Closer to Epoxy PCB Substrates

Higher Tg



Dielectric Properties



Weaknesses of Cure Type

Solvent Evaporation

- Higher chloride contamination potential
- Process intensive, difficult to maintain viscosity, complex mix ratios
- Potential for high stress during temperature cycling conditions
- Difficult to rework
- High probability of reversion under temperature and humidity stress conditions

Heat Cure

- Cure is dependent on thickness
- Component mass affects time and temperature of cure process
- Susceptible to cure inhibition
- Selective coating quality (edge definition) could be impacted
- Shrinkage (3% – 10%), potential for damaging fragile (e.g., glass) components
- Should be used with caution for low temperature components

UV Cure

- One-component coatings require accurate application material to avoid shadowed areas
- Two-part systems require meter mix equipment
- Some coatings are more difficult to rework
- UV intensity and wavelength effects cure
- Some secondary cure mechanisms require heat exposure

Catalyzed

- Cure inhibition
- Short work life
- Contamination sensitive
- Difficult to rework
- Pungent odor

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