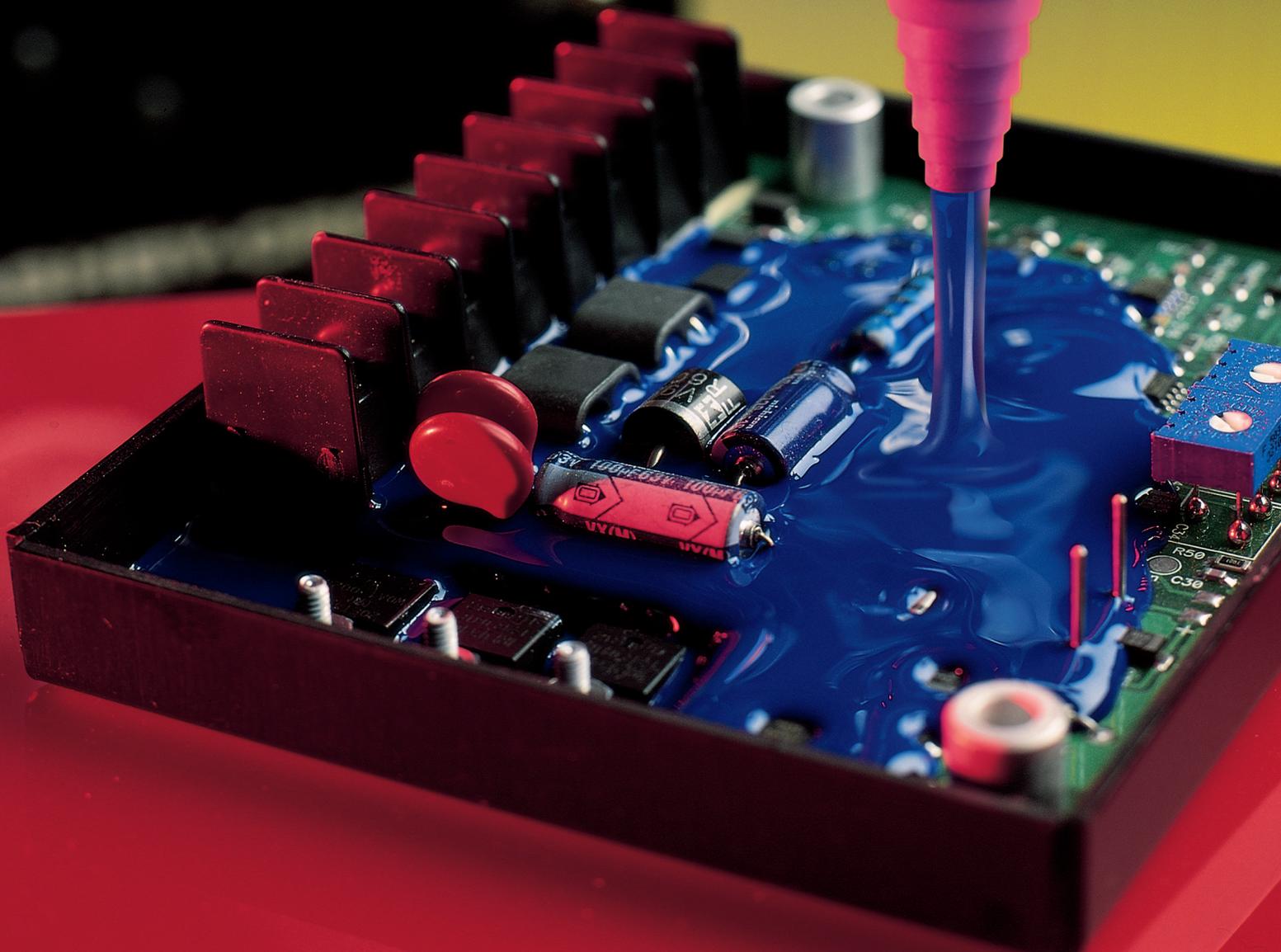


# ELECTRONICS PROTECTION

Enclosures & Cases • Thermal • EMI/EMC/ESD • Shielding • Power • Hardware  
Connectors & Cabling • Shock/Vibration • Electronics Packaging • Contamination

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## Epoxies, Etc. - Protecting and Improving Electronic Components Performance



## Protecting and Improving Electronic Components Performance

*Al DeSisto, Director of Technical Sales  
Epoxies, Etc.*

Electronics assemblies have continued to shrink in size over the years. At the same time, they are being designed to deliver more power than ever before. Spacing between components is getting smaller. Packages are typically made of molded plastics instead of metal for performance and economical reasons. All of these factors lead to higher heat generation and the need to remove it. Fans, vents and large heat sinks can be effective, but they take up space. In the case of a fan, additional power is required. None of these options address the added need for environmental protection. Exposure to dust, moisture, humidity, airborne particulates and immersion in liquids are real threats to reliable performance. Physical movement (such as shock and vibration) in operation can loosen unprotected components and cause failure. Sophisticated electronics with proprietary designs need to be protected.

Thermally conductive potting compounds are an effective way to resolve a number of design and processing challenges. They can:

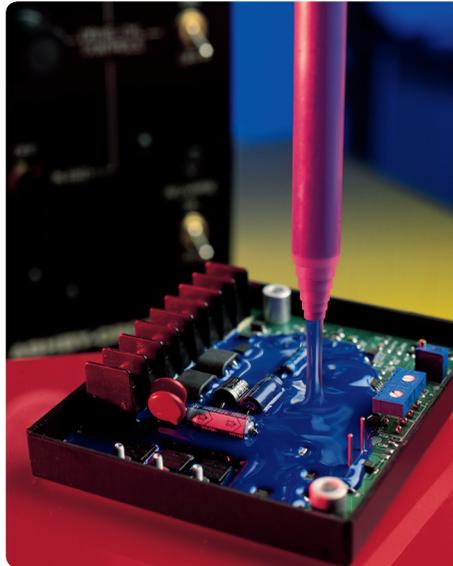
- Provide efficient energy transfer from heat generating sources such as power supplies, power converters and IC's to heat sinks
- Increase efficiency and service life of motors by helping to prevent overheating
- Have outstanding dielectric properties
- Protect components from chemicals, moisture and airborne particles
- Act as a permanent barrier to intrusion and protect intellectual property
- Provide structural stability to an assembly that undergoes thermal or mechanical shock
- Aid in compliance to UL requirements and the stringent RoHS and REACH standards

Epoxies, Etc. incorporates proprietary resin and filler technology into epoxy, urethane and silicone potting compounds to create a product that will allow for efficient and uniform dissipation of heat away from its source. Added benefits of using these can include:

- Better matching of CTE (coefficient of thermal expansion); mismatched thermal expansion can result in cracking, distortion or loss of adhesion
- Higher heat resistance; this means the encapsulant is less prone to thermal breakdown over extended periods of time
- Flame retardancy
- Lower shrinkage on cure
- Lower exothermic reaction temperature on cure; as the reaction takes place when converting from a liquid to a solid, heat is generated. Thermally conductive potting compounds dissipate that heat away, minimizing the effects of the cure on heat sensitive components.
- Lower outgassing (space qualified electronics)
- Lower stress on sensitive components

Selection criteria for an appropriate compound can include any of the following factors:

- Temperature range of use
- Environmental conditions (humidity, sunlight, chemical environment)
- Physical conditions (mechanical shock/vibration)
- Specific electrical properties (dielectric strength, volume resistivity, dielectric constant)
  - Viscosity
  - Total area to be potted
  - Configuration of the area to be potted
  - Process considerations (speed of assembly, existing equipment in use, cure temperature, cure time, etc.)
  - Regulatory requirements



Many design engineers are challenged to find a thermally conductive potting compound that meets all of their requirements. A large manufacturer of LED's recently contacted Epoxies, Etc. for assistance with an application for potting with special requirements.

They needed a product that could help to move the heat away from their LED's to give the product even longer working life. The potting compound would be covering a large surface area so it needed to flow well to get around the numerous components and have low shrinkage on cure. Once cured at room temperature, it needed to protect components

from vibration, physical impact, rapid temperature excursions, and occasional immersion in water or salt water and incidental contact with a broad range of chemicals. Adhesion to the plastic case was an absolute necessity. It needed to comply with RoHS and REACH requirements and had to be UL listed. Since this was going to be a high volume part, the potting compound needed to be easy to use and compatible with meter mix dispense equipment.

The solution that met those criteria was Epoxies, Etc.'s 50-2369FR. It is a specially formulated UL94 V-0 listed thermally conductive polyurethane potting compound. Despite the large volume of material required per part, 50-2369FR will not produce significant heat during cure. Shrinkage is minimal, so there is no built in stress on components. The viscosity is low enough to allow it to flow around parts and into fairly tight tolerance areas and to cure to a void free solid. The proprietary fillers are non-abrasive, reducing wear and maintenance on meter mix equipment. It will not crack when exposed to shock, vibration or rapid thermal changes and will protect components from moisture, humidity or immersion in liquids.

Due to the complexities of new designs and the high demands on performance, it is important to enlist the help of an experienced formulator early in the process when considering the use of a potting compound in an electronic assembly. The Technical Staff at Epoxies, Etc. are prepared to provide fast, courteous assistance in product selection, whether it is an epoxy, urethane or silicone.

*Epoxies, Etc., an ISO 9001:2008 registered company, is a formulator of specialty epoxies, urethanes, silicones and UV curable systems. Epoxies, Etc. takes pride in its commitment to the research, development and consistent manufacturing of materials for today's demanding applications. For more information, visit [www.epoxies.com](http://www.epoxies.com).*