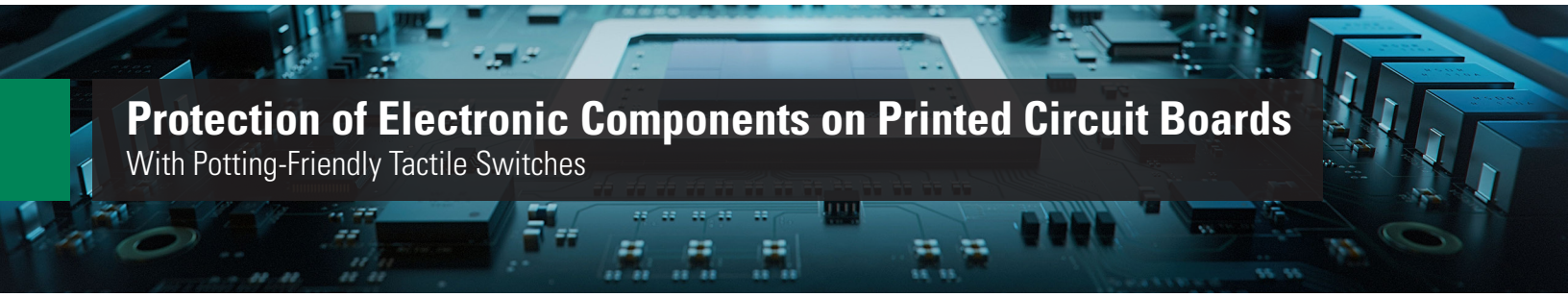

Protection of Electronic Components on Printed Circuit Boards

With Potting-Friendly Tactile Switches

Introduction

In the realm of electronics, ensuring the longevity and reliability of printed circuit boards (PCBs) is crucial. PCBs are fundamental to all electronic devices, and selecting the appropriate method to protect their critical components from damage and harsh environmental conditions is essential. This application note compares two primary methods of safeguarding electronic components mounted on PCBs: conformal coating and potting. Each technique offers distinct advantages and disadvantages, making the selection process vital for optimal performance and application requirements.

Conformal Coating

Conformal coating offers a lightweight and versatile protection solution. This method involves applying a thin, protective layer of insulation material to the PCB, conforming to the contours of the components. This coating shields the PCB from environmental contaminants, such as moisture, dust, and chemicals. Several application methods are available:

- **Spraying:** This method uses an aerosol or spray gun to apply the coating material. It is suitable for both small and large production volumes and allows for selective coating.
- **Dipping (DIP coating):** The PCB is immersed in a tank containing the coating material, ensuring complete coverage. This method is efficient for high-volume production but may require masking to prevent coating certain areas.
- **Brushing:** This manual method is suitable for small production volumes or rework. It allows for precise application but is time-consuming.

The thinness of the conformal coating, typically between 25 and 75 µm, minimizes the impact on the assembly's weight and space. This thinness also allows for easy inspection and repair of components, a significant advantage during testing or maintenance phases. Furthermore, the variety of available coating materials, such as acrylic, urethane, silicone, or epoxy, enables the protection to be tailored to the specific requirements of each application.

However, it is important to note that this method offers limited protection against mechanical stress and vibration and may not be suitable for components with sharp edges or complex geometries. Its effectiveness is also reduced in extreme environments.

Potting

Potting is renowned for its robust and durable protection. The process involves fully encapsulating the PCB or specific components in a resin. Once the resin cures, it creates an impenetrable barrier against mechanical stress, vibration, and extreme environments. This method ensures excellent electrical insulation which are crucial for critical applications. Additionally, potting offers an elevated level of physical security and tamper resistance, making it ideal for applications requiring maximum reliability. It also provides full environmental protection by shielding against moisture, dust, chemicals, and corrosion. The mechanical stability of potting absorbs vibrations and shocks, preventing component damage. Furthermore, the hard-to-remove resin deters reverse engineering, enhancing tamper resistance. Some resins used in potting also enhance heat dissipation, which is beneficial for high-power applications.

However, it is important to note that repairing potted components is often challenging, if not impossible. Moreover, the addition of resin increases the weight and size of the assembly, and the overall cost is generally higher compared to conformal coating. Nevertheless, potting is the best choice for impact resistance. If a device needs to withstand potential impact damage, potting provides the highest level of protection. It is also suitable when significant vibration dampening, heat dissipation, and enhanced privacy and security are required.

Figure 1: PCB With a KSCXA Tactile Switch. Process of Being Filled With Potting Material

C&K Littelfuse Solution: Potting-Friendly Tactile Switches

KSC PF Series Switch is designed to meet the size and performance requirements of products with small surface areas, while also withstanding harsh elements such as liquids and vibrations.

The KSC PF tactile switch combines a compact SMT form factor (6.2 x 6.2 x 5.2 mm) with a potting-friendly extended cage, enhancing potting level tolerance, enabling faster production, and improving quality. The traditional method of using a flat cage does not permit potting above this cover. With the usage of an extended cage, this issue is effectively avoided, which simplifies the production process, and ensures better control.

The KSC PF is IP67 sealed, offers life cycles of up to 1,000K and is designed for SMT, making PCB assembly easy. For more information about KSC PF switches, please follow this **link**.

KSC XA Series Switch is also available with extended cage to allow potting material.

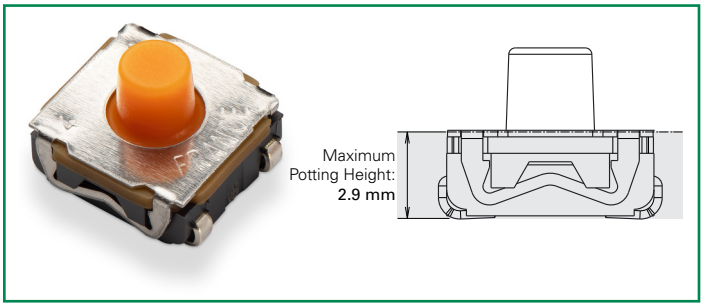

Figure 2: KSC4 Series Tactile Switch Standard Version With Flat Cage

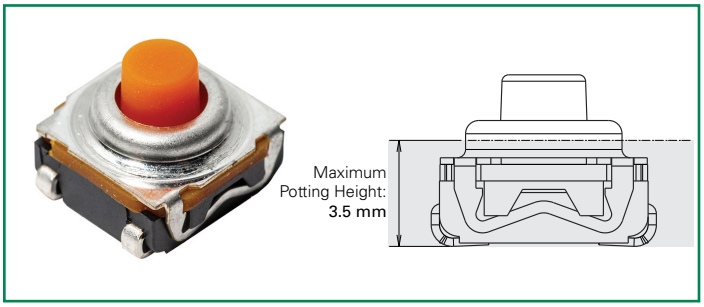

Figure 3: KSC PF Series Tactile Switch (Potting-Friendly) With Extended Cage

Notes:
1. Maximum potting height for the KSC4 Series is 2.9 mm. Potting must not exceed the top of the frame.
2. Maximum potting height for the the KSC PF Series is 3.5 mm.

Focus Applications