



SCS ELECTRONICS COATINGS

Reliable protection for advanced electronics.



SCS

SCS CONFORMAL COATINGS

SCS' industry-leading portfolio of conformal coatings includes Parylene coatings, liquid coatings, plasma polymerized coatings, atomic layer deposition (ALD) coatings and multilayer coatings. Combining the properties of these coatings with over 50 years of experience, vast technology and worldwide resources, SCS provides electronics manufacturers with reliable coatings and services, including specially-engineered coatings such as Parylene HT® and ParyFree®, which provide thermal stability in harsh environments and halogen-free barrier properties, respectively. Additionally, SCS multilayer

coatings (e.g., ALD+Parylene) feature enhanced barrier properties to protect challenging sub-sea or fully-immersed electronics applications. SCS coatings offer a host of beneficial attributes, including:

- Excellent dielectric properties
- Excellent chemical and moisture barrier properties
- Biocompatible and biostable protection
- Ultra-thin, conformal coating of all exposed surfaces
- Excellent crevice and multi-layer penetration
- Thermal stability up to 450°C (short-term)
- Unparalleled ultraviolet stability

PROTECTION FOR ADVANCED ELECTRONICS

SCS can apply conformal coatings to virtually any surface material, including metals, elastomers, resins, plastics and ceramics, in thicknesses ranging from a few hundred angstroms to several mils. The coatings form as films that conform to all surfaces, edges and crevices of a substrate, including the interior of multi-layer electronic packages.

The properties of these coatings provide protective solutions to customers in a variety of industries, including:

CONSUMER ELECTRONICS

Consumers rely on the use of advanced electronic technologies for numerous day-to-day activities. Smart electronics, including phones, watches, headphones, wearables, portable speakers, etc., are compact by design and hold hundreds of components that need to operate reliably for everyday use. SCS ultra-thin coatings provide superior barrier properties, including waterproof protection per IPX7 and IPX8 and protection against perspiration, humidity and dust.

AUTOMOTIVE & TRANSPORTATION

SCS conformal coatings are often used to protect critical sensors, circuit boards, battery management system components and other electronic parts from harsh chemicals, fluids and gases, even when such exposures occur in high temperature environments encountered during use in engines and other systems.

SCS' extensive experience in transportation quality standards, including PPAP processes and IATF 16949, is a benefit to high-volume automotive and transportation customers.

AEROSPACE AND DEFENSE

SCS conformal coatings offer durable protection for components used in numerous aerospace and defense applications, including commercial aircraft and equipment for international space programs. Conformal coatings like HumiSeal® 1A33 polyurethane and Parylenes are also excellent for electronics used in defense vehicles and equipment to protect against elements such as moisture, dust, sand and chemical and biological agents. Many SCS conformal coatings are recognized as meeting the requirements of IPC-CC-830 and are listed on the QPL for MIL-I-46058.

MEDICAL

SCS coatings protect medical electronic components and devices from moisture, fluids, gases and sterilization processes that can affect reliability and cause assemblies to fail prematurely. Such protection improves performance, extends device life, prevents costly repairs and reduces the risk of failure.

Of the coatings provided by SCS, Parylenes stand out as the preferred choice for critical medical device applications. Specifically, Parylenes N, C, ParyFree and Parylene HT provide necessary protection for medical electronics, including electromechanical and electrosurgical devices, infusion and fluid heating technologies, robotic surgical systems and ultrasound and x-ray imaging platforms. The coatings protect components as well as serve as a biocompatible surface for tissue contact.

PROPERTIES OF SCS CONFORMAL COATINGS

Following is an overview of the most common properties and benefits of SCS conformal coatings. Because each coating maintains its own unique properties and every application requires specialized protection, SCS' sales and engineering teams stand ready to help customers select the best coating for their specific application based on environmental and performance requirements.

BARRIER PROPERTIES

SCS conformal coatings are excellent moisture and chemical barriers, providing protection against corrosive liquids, fluids, gases and chemicals, even at elevated temperatures.

Conformal coatings are often a key component in preventing moisture ingress into electronics and are frequently part of IPX7 or IPX8 electronics designs. Coatings that have successfully passed IPX7 or IPX8 testing per the applicable requirements of IEC 60529, test conditions 14.2.7 and 14.2.8, demonstrate protection from harmful effects due to the ingress of water. These tests ensure that coated electronics function normally both during and after immersion in water for more than 30 minutes at a depth of 1 m (IPX7) and 1.5 m (IPX8).

In addition to IPX waterproofing capabilities, several conformal coating variants provide protection against corrosion; one example is circuit boards coated with Parylene HT that were salt-fog tested by an independent facility. The coated boards showed no corrosion or salt deposits after 144 hours of exposure in accordance to ASTM B117-(03) (See Figure 1). Boards coated with SCS Parylenes C and ParyFree exhibited similar results.

DIELECTRIC PROPERTIES

Dielectric properties of conformal coatings are critical in powered applications such as circuit boards and sensors in the automotive, industrial electronics, aerospace and defense industries. Low dielectric constants and dissipation factors, for example, enable coatings to transfer electrical signals without absorption or loss.

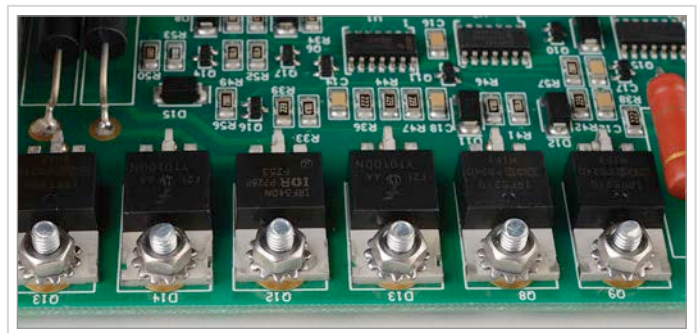
THERMAL & CRYOGENIC STABILITY

Conformal coating applications are exposed to a wide range of temperatures. From harsh operating environments such as the cryogenic levels of space (-150°C to -273°C) to extreme temperatures of 450°C, SCS coatings provide thermal stability to ensure the trouble-free life of automotive, industrial electronics, aerospace and defense components.

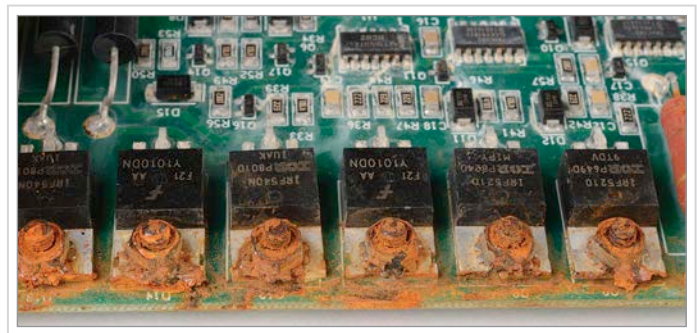
METAL WHISKER MITIGATION

As a result of industry directives, pure metal plating is replacing lead in the solders used throughout the worldwide electronics industry. While safer for the environment, metal plating is known to form whiskers, which cause reliability problems for electronic systems. Conformal coatings have been shown to suppress the formation of metallic whiskers, OSEs (odd shape eruptions) and dendrites.

FIGURE 1: Circuit boards after 144 hours of salt-fog exposure



Coated with SCS ParyFree

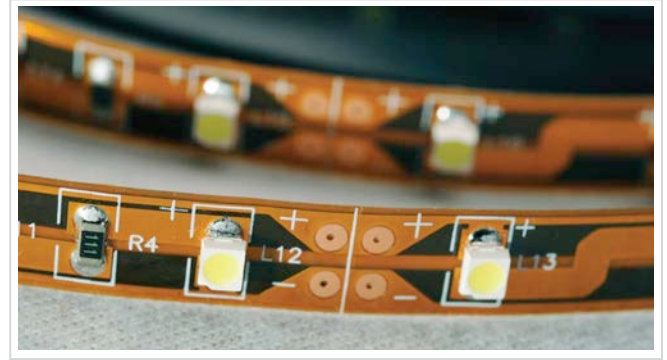


Uncoated



INNOVATIVE SOLUTIONS FROM THE LEADER IN CONFORMAL COATINGS

With over 50 years of experience in conformal coating engineering and applications, Specialty Coating Systems (SCS) is the world leader in Parylene, liquid, plasma polymerized, ALD and multilayer conformal coating technologies. We're a direct descendant of the companies that originally developed Parylene, and we leverage that expertise on every project – from initial planning to process application.



SCS employs some of the world's foremost conformal coating specialists, highly experienced sales engineers and expert manufacturing personnel, working in state-of-the-art coating facilities around the world. Our extensive, proactive approach to production and quality requirements gives our customers peace of mind and minimizes the resources they need to meet even the most challenging requirements and specifications.

As worldwide industry requirements and directives continue to evolve, SCS is at the forefront, ensuring our facilities, products and services comply with relevant regulatory and environmental standards.

- AS/EN 9100 and ISO 9001 certifications
- Nadcap® accreditation
- Requirements of IPC-CC-830
- QPL for MIL-I-46058C
- UL (QMJU2) recognized coatings
- Listings in the International Aerospace Database (OASIS)
- REACH and RoHS compliance
- Biocompatibility per ISO 10993
- US FDA Drug and Device Master Files

For additional standards and certifications to which SCS and/or SCS coatings comply, please visit SCScomplies.com or contact SCS.



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