Apacer

# Protective Coatings

## White Paper

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# 1. Introduction

The ideal computing environment is a clean, quiet place. But modern industrial computer manufacturers know that in order to stay competitive, they have to create devices that can maintain optimal performance even in environments that are not ideal.

The manufacturing floor, in many factories, can be a dusty place, with various gases or particulates being released as part of the manufacturing process. As these contaminants enter the local atmosphere, they can be blown or sucked into computing devices by the airflow of cooling fans, and come into contact with delicate components. In order to protect SSDs and DRAM modules from these contaminants, Apacer employs various methods of coating, covering sensitive components in a protective barrier.

This white paper will investigate the various methods of coating, examining how they are applied and the various levels of protection they can provide.

# 2. Conformal Coating

The first method of protecting sensitive components from contaminants is conformal coating. Apacer uses acrylic, a chemical compound, for this process.

## 2.1 Acrylic

Acrylic is a well-understood material that has been in use in manufacturing since the 1940's. In recent years, it has been employed as a coating material in order to give greater protection to sensitive chips and components.

## 2.2 Process of Application

Apacer's production facility, located in Taiwan, has many engineers and production staff that are well trained and experienced in the process of acrylic coating, and all coating is carried out in-house. For products with smaller dimensions, acrylic will be applied using a spraying process. For larger products, a dipping process is used. In-house testing and inspection will also be performed to ensure the application is smooth, uniform and correct.

## 2.3 Advantages of Acrylic

There are many advantages to using acrylic as a coating material. The application and drying process is relatively simple, and acrylic also offers good moisture protection. Acrylic also has a high fluorescence level, and the viscosity can be easily adjusted if needed. Also, compared to nano coating, acrylic is relatively inexpensive.

In Figure 1-1 and 1-2 below, a DRAM module and an SSD which have been coated with acrylic are shown. UV illumination is used to confirm that the acrylic coating is even and unbroken over the desired surface area.

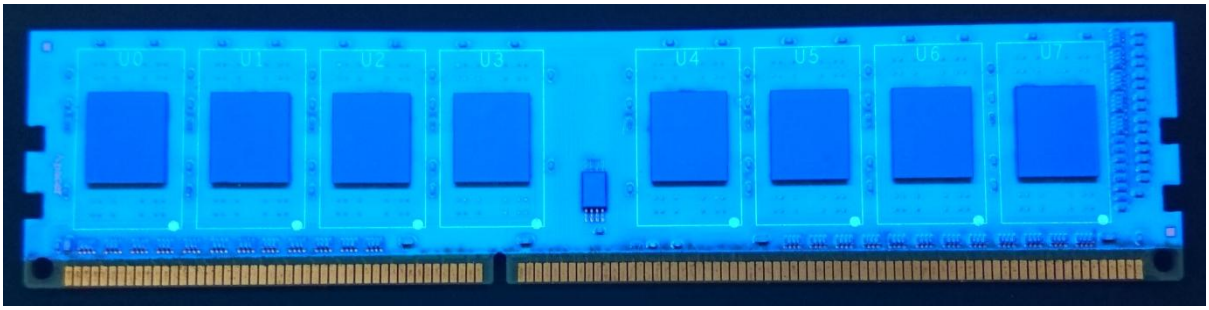

**Figure 1-1 Acrylic Coated DRAM Module Under UV Light**

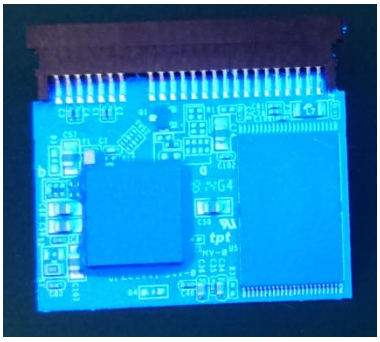

**Figure 1-2 Acrylic Coated SSD Under UV Light**

## 2.4 Conformal Coatings using Other Materials

Apacer's engineering and production staff also have extensive experience using other materials for conformal coating. Epoxy, urethane and silicone are the most common materials that are requested by our clients. Depending on the material chosen, the application process may also require a baking step, which can be carried out in-house at Apacer's Taipei production facility. Apacer's production staff members are careful to follow the IPC-A-610E standard to ensure coating material never comes into contact with gold fingers.

To discuss using an alternate material for conformal coating, interested parties should contact their local Apacer representative directly.

# 3. Nano Coating

The second method of protecting sensitive components from contaminants is nano coating. Apacer uses parylene, a chemical compound, for this process.

## 3.1 Parylene

Parylene coating was first developed by the American aerospace industry. It was used to protect components that would be used in communications satellites and other defense equipment. Once its advantages were well known, the technology was adopted by the commercial manufacturing world, and it has been used for over 40 years now with great success.

## 3.2 Process of Deposition

The process of applying parylene coating to components is not particularly complex. First, a solid raw material known as dimer is heated in a vacuum and vaporized into a dimeric gas. Next, the gas is pyrolized to cleave the dimer to its monomeric form. Finally, in the room-temperature deposition chamber, the monomer gas deposits on all surfaces as a thin, transparent polymer film.

This gaseous application method results in an extremely even and uniform application, much more so than liquid dipping or spraying. And the film of coating material is incredibly thin – hence the name nano coating.

## 3.3 Advantages of Parylene

There are many advantages to using parylene as a coating material. For starters, it's completely non-toxic. It also produces a highly dense film, with no pinholes, and is quite thin – between 1 and 50 micrometers. The film is also uniform and conformal. It is resistant to water, and is an excellent barrier for moisture, solvent and chemicals. It also boasts excellent dielectric properties and protects against corrosion.

## 3.4 IP 57 Rating

Another important distinction that sets nano coating apart from conformal coating is that components treated with nano coating are compliant with the IP 57 standard. This means that the product is protected against dust that might interfere with operation, as well as immersion in water (but not continuous immersion). Typically, Apacer customers that require compliance with this standard are manufacturing products that will be used in defense applications. But any application that requires IP 57 certification can benefit from the application of nano coating. Manufacturers looking to provide rugged solutions will want to consider nano coating as a competitive edge.

# 5. Conclusion

This paper has examined the differences between conformal and nano coating, the processes in which they are applied, and the value-adding features of each option. Both options will increase the protection level of sensitive chips and components on Apacer SSDs and DRAM modules. Depending on where these products are used, coatings could have a significant impact when it comes to the operational life of a particular device. Manufacturers looking for IP 57 certification for their final products will certainly want to keep nano coating in mind, but both options have already been adopted by many of Apacer's international partners.

# Revision History

| Revision | Description | Date |
|---|---|---|
| 1.0 | Official release | 9/12/2019 |

# Global Presence


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