

# Grounding and Shielding Excellence: The DoubleShield SMT Pad

*By Monica Monte, Schlegel Electronic Materials*

As automotive, aerospace, and electronics industries continue to advance, the need for reliable grounding and EMI shielding solutions has never been more critical. Modern applications demand components that offer high electrical performance and resilience under mechanical and environmental stress. Schlegel Electronic Materials, Inc.'s DoubleShield Surface Mount Technology (SMT) Pad provides a cutting-edge solution for applications requiring robust grounding contact and EMI shielding while maintaining performance in the most demanding environments.

## **Challenges in Grounding and EMI Shielding**

Grounding and EMI shielding in high-performance electronic systems face several challenges, especially as devices become more compact and integrated. Automotive systems' components, such as advanced driver assistance systems (ADAS), infotainment modules, and powertrain electronics, are particularly vulnerable to electromagnetic interference (EMI). Maintaining signal integrity in these systems is essential for safety and operational efficiency.

In these applications, grounding components must also withstand mechanical stresses like high vibrations, compression, and thermal cycling. Traditional grounding methods, such as metal fingerstock or fabric gaskets, may not offer the same durability, flexibility, and electrical performance, especially over extended product lifecycles.

## **DoubleShield SMT Pad: Designed for Performance**

The DoubleShield SMT Pad (Fig.1) addresses these challenges by combining advanced materials and a unique structure designed to optimize electrical and mechanical performance. Here are the key technical features of the DoubleShield Pad that make it ideal for demanding grounding applications:

- **Low Electrical Resistance and High Conductivity:** The DoubleShield SMT Pad is designed with exceptionally low electrical resistance at 0.020 ohms at recommended compression levels (RCS), ensuring effective grounding performance. The conductive silicone rubber shell and a Sn/Ni/Cu metallization provide excellent conductivity while maintaining consistent electrical contact, even under compression, ensuring reliable EMI shielding and grounding.
- **Superior Compression Set Recovery:** A key advantage of the DoubleShield Pad is its compression set recovery, which is critical for maintaining contact under repeated compressions in high-vibration environments. With a compression set of 10-13% (ISO 815 at 22h/125°C), the pad recovers well after deformation, ensuring reliable electrical contact over the product's life. This feature is particularly valuable in automotive electronics, where long-term performance is essential.
- **Compression and Bounce Back Performance:** The DoubleShield Pad's compression force is carefully optimized, with a force to compress to RCS ranging from 2.0 N to 5.5 N, depending on the pad variant. This ensures the pad provides sufficient mechanical resilience while maintaining the necessary electrical contact. The SMT-compatible pad is designed to maintain its form and function in high-compression environments, reducing the risk of failure over repeated cycles.
- **Thermal and Environmental Resistance:** The DoubleShield SMT Pad's operating temperature range is from -40°C to +125°C, making it suitable for extreme environments, including automotive and industrial applications. The pad has undergone rigorous testing to ensure long-term reliability, including thermal cycling (-40°C to +125°C over

1000 cycles) and accelerated life testing. Its durability in dry heat (125°C for 2000 hours) and damp heat (85°C/85% RH for 1000 hours) ensures the pad's continued performance even in challenging environmental conditions.

The DoubleShield SMT Pad fulfills the requirements of the Directive 2011/65/EU and its amendments (RoHS).

### Technical Advantages Over Traditional Solutions

When compared to traditional grounding solutions like metal fingerstock or fabric gaskets, the DoubleShield SMT Pad offers several critical advantages:

#### 1. Large Contact Area:

The pad's flexible surface provides a significantly larger contact area than traditional metal springs or fingerstock. This larger contact area improves grounding reliability and allows for better utilization of PCB real estate, freeing up space for additional components.

#### 2. Non-Abrasive Surface:

Unlike metal gaskets, the DoubleShield SMT Pad is non-abrasive, ensuring it does not scratch or damage the contacting surfaces. This makes it particularly useful for applications where delicate components must maintain integrity throughout repeated use.

#### 3. Clean SMT Assembly Integration:

The pad is compatible with surface mount technology (SMT) equipment, allowing for automated assembly in high-volume production environments. This minimizes the need for secondary processing, reduces production costs, and improves assembly repeatability. Delivered in tape-and-reel format, the SMT Pad fits seamlessly into existing PCB assembly lines, offering design engineers a cost-effective, streamlined solution.

### Applications in High-Stress Environments

The DoubleShield SMT Pad is engineered for use in high-stress environments where grounding reliability is paramount. Its combination of electrical and mechanical performance makes it ideal for the following applications:

- **Automotive Electronics:** The pad ensures EMI shielding and reliable grounding in ADAS, radar, infotainment systems, and electronic control units (ECUs) in environments subject to high vibrations and thermal extremes. Its ability to withstand thermal cycling and damp heat ensures long-term reliability in automotive applications.
- **Aerospace and Defense Systems:** Aerospace applications that require precise EMI shielding in harsh environments benefit from the DoubleShield Pad's low electrical resistance and durability under extreme conditions. It is well-suited for avionics, satellite systems, and radar equipment where reliable grounding is essential.

- **Industrial Control Systems:** In manufacturing and process control, grounding components are exposed to harsh operational conditions, including high temperatures and mechanical stress. The DoubleShield SMT Pad provides consistent grounding contact and EMI shielding in these environments, ensuring system reliability and performance.

### Summary of Key Technical Specifications

- **Electrical Resistance:** 0.020 ohms at RCS, ensuring reliable grounding and EMI shielding.
- **Compression Set:** 10-13% at 125°C for 22 hours, ensuring minimal deformation under prolonged compression.
- **Compression Force:** 2.0-5.5 N, optimized for maintaining electrical contact without excessive mechanical load.
- **Thermal and Environmental Resistance:** Operating range: -40°C to +125°C. Proven performance after 1000 cycles of thermal cycling and 2000 hours of dry heat exposure.

DoubleShield SMT Pad delivers an advanced, reliable grounding solution for industries facing increasingly complex EMI shielding challenges. With its low electrical resistance, excellent compression recovery, and ability to withstand extreme environments, the DoubleShield Pad offers a high-performance solution for a wide range of critical applications in automotive, aerospace, and industrial control systems.

By incorporating the DoubleShield SMT Pad into their designs, engineers can ensure long-term reliability, improved grounding performance, and streamlined manufacturing processes. This innovative product meets the rigorous demands of modern electronics, providing a trusted solution for some of the industry's toughest grounding and shielding challenges.



Figure 1