GORE® SMT EMI Gaskets and Grounding Pads

Excellent electrical performance with SMT convenience

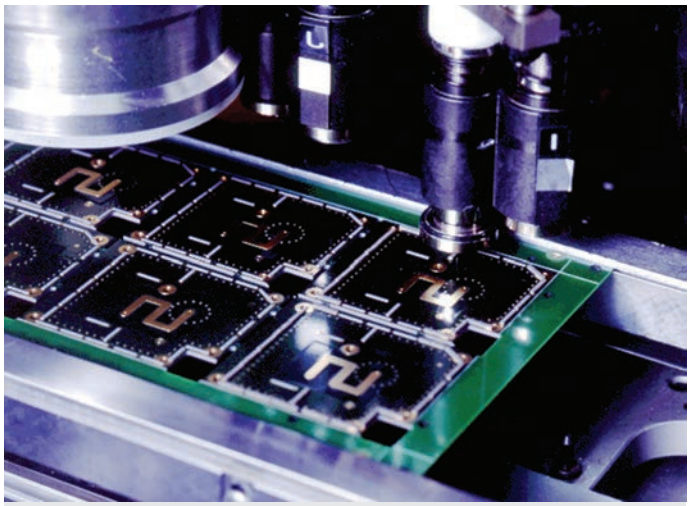
GORE® SMT EMI Gaskets and Grounding Pads combine unsurpassed conductivity with the convenience of SMT-compatible format. These conformable components are engineered to maintain consistent contact and low DC resistance. Unlike the traditional designs of pogo pins and universal clips that can easily break, the robust design of GORE® SMT EMI Gaskets and Grounding Pads increase durability with large contact surfaces rather than single-point contacts. The unique construction of GORE® SMT EMI Gaskets and Grounding Pads ensures that the device maintains signal integrity and reliable electrical performance in harsh environments.

Because of their compatibility with SMT equipment for printed circuit board production, GORE® SMT EMI Gaskets and Grounding Pads reduces total costs. Using these off-the-shelf components eliminates the need for custom designs that can increase engineering costs. Also, no secondary processing is required, which reduces equipment and labor costs during production. Using precise SMT equipment to incorporate GORE® SMT EMI Gaskets and Grounding Pads improves the consistency and repeatability of PCB assembly, thus decreasing waste.

GORE® SMT EMI Gaskets and Grounding Pads offer a full spectrum of working ranges, making them ideal for use as grounding pads, EMI gaskets, and antenna contacts. The highly compressible SMT Supersoft Series delivers consistent electrical performance with minimal force required for initial conductivity. The SMT GS5200 Series offers the highest conductivity under compression in Gore's EMI shielding product line. In addition to these high-performance characteristics, GORE® SMT EMI Gaskets and Grounding Pads have been tested against a variety of environmental standards (Table 1).

Typical Applications

- Portable electronic devices such as smartphones and tablets
- GPS and handheld scanners/readers
- Gaming devices
- Personal computers and laptops
- Telecommunication infrastructure



Benefits of GORE® SMT EMI Gaskets and Grounding Pads

- Excellent shielding effectiveness and low DC resistance with conformable construction
- Reliable electrical performance achieved through consistent contact over time
- Reduced total costs versus custom options due to standard sizes and compatibility with SMT technology
- Increased design flexibility with easily integrated standard parts
- Consistent and repeatable assembly with parts that need no secondary processing
- Enhanced durability due to conformable material that maintains contact over time without compromising the integrity of the mating surface
- Faster production times because of standard solder process that requires no cure time

GORE® SMT EMI Gaskets and Grounding Pads

Table 1: Environmental Properties

Property	Value
Operating temperatures	-55°C to 125°C
RoHS Status* (lead, cadmium, hexavalent chromium, mercury, bromine)	Pass
Flammability in accordance with UL horizontal burn method	Pass

*W. L. Gore & Associates declares that we do not intentionally add substances listed in EU Directive 2011/65/EU to GORE® SMT EMI Gaskets and Grounding Pads. Independent lab tests have been performed and results are available upon request.

Selection Guidelines

GORE® SMT EMI Gaskets and Grounding Pads are engineered to survive multiple reflow processes. These gaskets and grounding pads maintain conductivity in a wide range of service heights (gap distances). The closure force requirements and broad range of tolerance take-up in these materials results in multiple product options for some gap distances. Selecting the most suitable product for a given application depends on the following:

- Gap distance of interfacing surfaces
- Required compression force to achieve the specified gap distance
- Necessary DC resistance for grounding applications or shielding effectiveness for shielding applications at a specific gap distance

The recommended service height for the various products in GORE® SMT EMI Gaskets and Grounding Pads differs because of their unique constructions (Figures 1 & 2).

Figure 1: Recommended Compressed Part Heights for SMT Supersoft Series

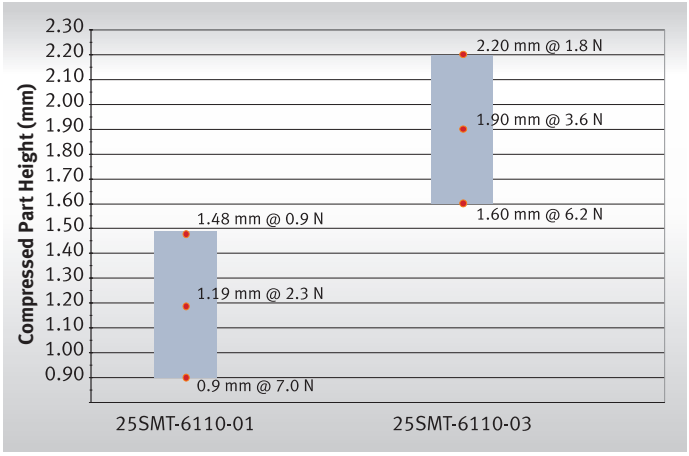
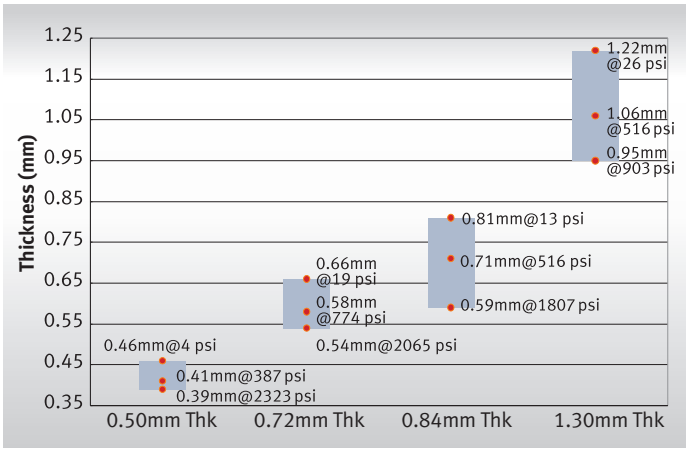


Figure 2: Recommended Service Heights for SMT GS5200 Series



GORE® SMT EMI Gaskets and Grounding Pads — SMT Supersoft Series

The SMT Supersoft Series is highly compressible to ensure consistent electrical performance. These components are conductive on contact and resilient after compression (Table 2). This combination of highly compressible construction and minimal force requirements makes them an excellent choice for use with metallized plastic housings and a variety of components, including LCDs, flexible circuits, antennas, and cameras. In addition, the SMT Supersoft Series protects against harsh conditions like shock and vibration encountered in applications such as handheld scanners. The highly compressible construction also provides consistent contact in housings that have surface variations like those in magnesium as-cast enclosures.

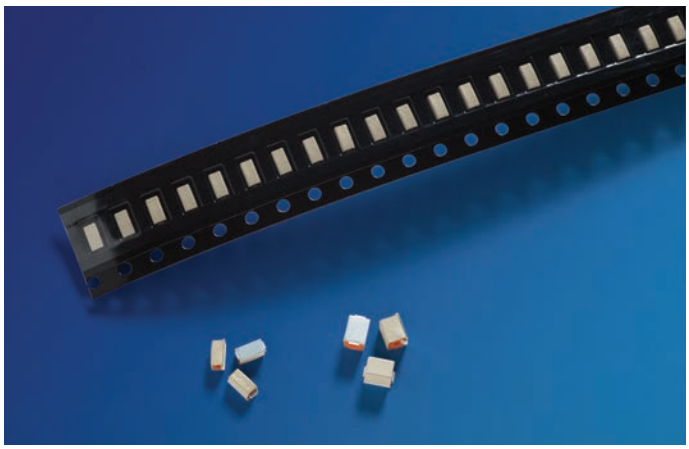


Table 2: SMT Supersoft Series Typical Performance[1]

Gore Part Number	Thickness (mm)	Length (mm)	Width (mm)	Weight (g)	Low Compression			Recommended Compression			High Compression		
					Compressed Part Height (mm)	DC Resistance (ohms)	Force to Achieve Compression (N)	Compressed Part Height (mm)	DC Resistance (ohms)	Force to Achieve Compression (N)	Compressed Part Height (mm)	DC Resistance (ohms)	Force to Achieve Compression (N)
25SMT-6110-01	1.66	3.56	1.79	0.020	1.48	0.008	0.9	1.19	0.006	2.3	0.90	0.009	7.0
25SMT-6110-03	2.42	3.58	2.57	0.037	2.20	0.012	1.8	1.90	0.011	3.6	1.60	0.011	6.2

[1] Values are for reference only and are not intended for specification purposes.

Accelerated Life Testing for SMT Supersoft Series

A crucial factor in assessing the acceptability of gaskets or grounding pads is their performance over time — performance that can be evaluated only through accelerated life testing. To evaluate durability of the SMT Supersoft Series, industry testing was performed at various conditions (Table 3) with parts soldered to a test board. Figure 3 shows the changes in DC resistance following exposure to the outlined conditions. The minimal amount of change in DC resistance for the SMT Supersoft Series demonstrates consistent and reliable performance in demanding environments.

Table 3: IEC Test Standards for Accelerated Life Testing (ALT) Conditions

	International Electromechanical Commission (IEC) Test Standard	IEC Standard No.	Test Conditions
1	Cold	60068-2-1	-65°C, 96 hours
2	Dry Heat	60068-2-2	+85°C, 96 hours
3	Vibration	60068-2-6	Sinusoidal 5 Hz to 100 Hz, 5g max. acceleration, 90 min. on each of the 3 axes
4	Salt Mist	60068-2-11	+35°C, 5 parts by weight NaCl and 95 parts by weight H_2O, 24 hours
5	Change of Temperature	60068-2-14	-40°C to +125°C, 30 min. @ extremes, 15 min. @ 25°C, 90 min. per cycle, 25 cycles
6	Mixed Flowing Gas	60068-2-60	Hydrogen sulfide (H2S) @ 100 PPB, sulfur dioxide (SO_2) @ 500 PPB, 96 hours
7	Damp Heat	60068-2-78	+65°C, 100% humidity, 96 hours

Figure 3: DC Resistance through ALT for 25SMT-6110-01

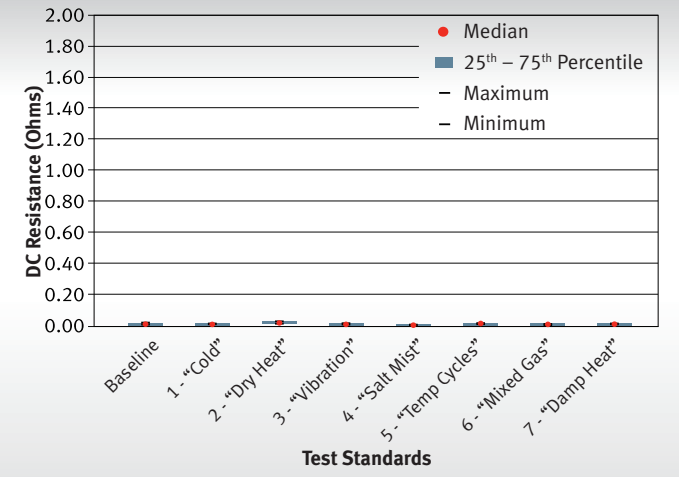
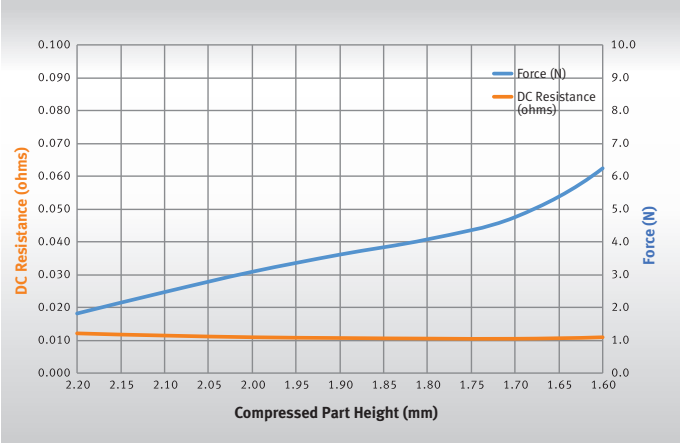


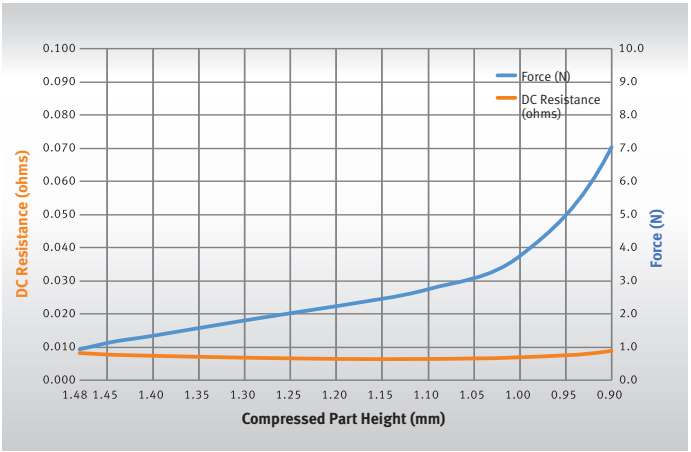
Figure 5: Force Displacement Resistance for 25SMT-6110-03



Force Displacement Resistance of SMT Supersoft Series

The SMT Supersoft Series provides conductivity on contact; however, the amount of force and DC resistance differs for each variant as seen in Table 2 and Figures 4-5.

Figure 4: Force Displacement Resistance for 25SMT-6110-01



GORE® SMT EMI Gaskets and Grounding Pads — SMT GS5200 Series

The SMT GS5200 Series offers the highest conductivity under compression in Gore's EMI Shielding product line (Table 4). The durability of these components extends their service life in challenging environments such as ruggedized scanners/readers, gaming devices, and wireless infrastructure. These highly conductive components recover easily after compression. Ideal for small footprint applications and for metal housings, the SMT GS5200 Series provides high performance and excellent reliability.

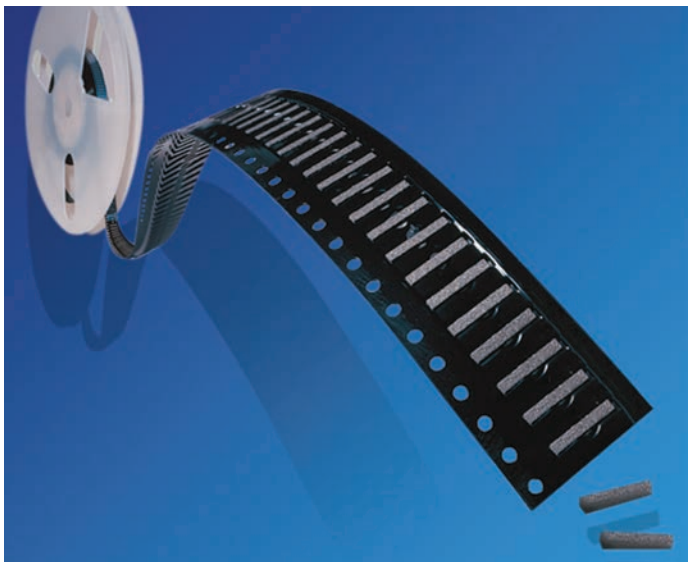


Table 4: SMT GS5200 Series Typical Performance[1]

Gore Part Number	Thickness (mm)	Length (mm)	Width (mm)	Weight (g)	Low Compression			Recommended Compression			High Compression		
					Stop Height (mm)	DC Resistance (ohms)	Pressure to Achieve Compression (psi)	Stop Height (mm)	DC Resistance (ohms)	Pressure to Achieve Compression (psi)	Stop Height (mm)	DC Resistance (ohms)	Pressure to Achieve Compression (psi)
25SMT-3645-21	0.50	5.50	1.10	0.0115	0.46	1.952	3.9	0.41	0.014	387.1	0.39	0.001	2,322.5
25SMT-3645-22	0.50	8.00	1.10	0.0160	0.46	1.952	3.9	0.41	0.014	387.1	0.39	0.001	2,322.5
25SMT-3645-34	0.50	5.50	0.90	0.0088	0.46	1.952	3.9	0.41	0.014	387.1	0.39	0.001	2,322.5
25SMT-3645-9	0.72	5.50	1.25	0.0158	0.66	0.492	19.3	0.58	0.003	774.2	0.54	0.001	2,064.5
25SMT-3645-10	0.72	8.00	1.25	0.0230	0.66	0.492	19.3	0.58	0.003	774.2	0.54	0.001	2,064.5
25SMT-3645-11	0.72	12.00	1.25	0.0339	0.66	0.492	19.3	0.58	0.003	774.2	0.54	0.001	2,064.5
25SMT-3645-17	0.72	5.50	1.10	0.0142	0.66	0.492	19.3	0.58	0.003	774.2	0.54	0.001	2,064.5
25SMT-3645-25	0.72	12.00	2.00	0.0500	0.66	0.492	19.3	0.58	0.003	774.2	0.54	0.001	2,064.5
25SMT-3645-26	0.72	8.00	2.00	0.0400	0.66	0.492	19.3	0.58	0.003	774.2	0.54	0.001	2,064.5
25SMT-3645-27	0.72	5.50	2.00	0.0240	0.66	0.492	19.3	0.58	0.003	774.2	0.54	0.001	2,064.5
25SMT-3645-33	0.72	3.20	1.10	0.0078	0.66	0.492	19.3	0.58	0.003	774.2	0.54	0.001	2,064.5
25SMT-3645-40	0.84	5.50	1.25	0.0110	0.81	1.939	12.9	0.71	0.028	516.1	0.59	0.001	1,806.5
25SMT-3645-41	0.84	3.20	1.25	0.0100	0.81	1.939	12.9	0.71	0.028	516.1	0.59	0.001	1,806.5
25SMT-3645-43	1.30	3.20	3.20	0.0370	1.22	0.322	25.8	1.06	0.003	516.1	0.95	0.001	903.2
25SMT-3645-44	1.30	8.00	2.00	0.0580	1.22	0.322	25.8	1.06	0.003	516.1	0.95	0.001	903.2

[1] Values are for reference only and are not intended for specification purposes.

Accelerated Life Testing for SMT GS5200 Series

A crucial factor in assessing the acceptability of gaskets or grounding pads is their performance over time — performance that can be evaluated only through accelerated life testing. To evaluate durability of the SMT GS5200 Series, industry testing was performed at various conditions (Table 5) with parts soldered to a test board. Figures 6-9 show the changes in DC resistance following exposure to the outlined conditions. The minimal amount of change in DC resistance for the SMT GS5200 Series demonstrates consistent and reliable performance in demanding environments.

Table 5: IEC Test Standards for Accelerated Life Testing (ALT) Conditions

	International Electromechanical Commission (IEC) Test Standard	IEC Standard No.	Test Conditions
1	Cold	60068-2-1	-65°C, 96 hours
2	Dry Heat	60068-2-2	+85°C, 96 hours
3	Vibration	60068-2-6	Sinusoidal 5 Hz to 100 Hz, 5g max. acceleration, 90 min. on each of the 3 axes
4	Salt Mist	60068-2-11	+35°C, 5 parts by weight NaCl and 95 parts by weight H_2O, 24 hours
5	Change of Temperature	60068-2-14	-40°C to +125°C, 30 min. @ extremes, 15 min. @ 25°C, 90 min. per cycle, 25 cycles
6	Mixed Flowing Gas	60068-2-60	Hydrogen sulfide (H2S) @ 100 PPB, sulfur dioxide (SO_2) @ 500 PPB, 96 hours
7	Damp Heat	60068-2-78	+65°C, 100% humidity, 96 hours

Figure 6: DC Resistance through ALT for 0.50 mm SMT GS5200 Series Parts

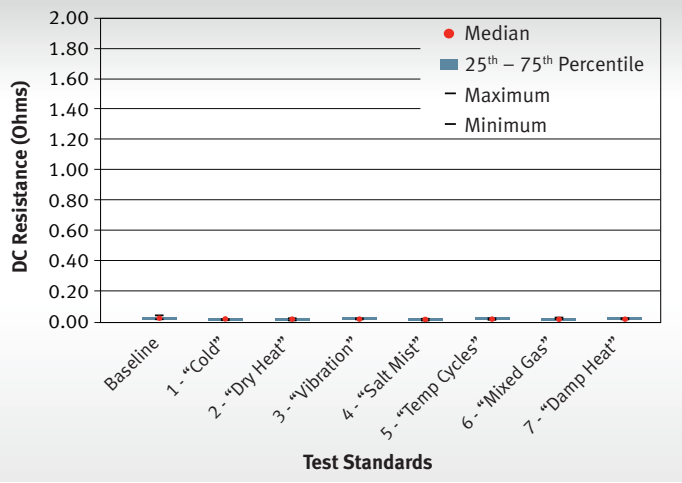


Figure 7: DC Resistance through ALT for 0.72 mm SMT GS5200 Series Parts

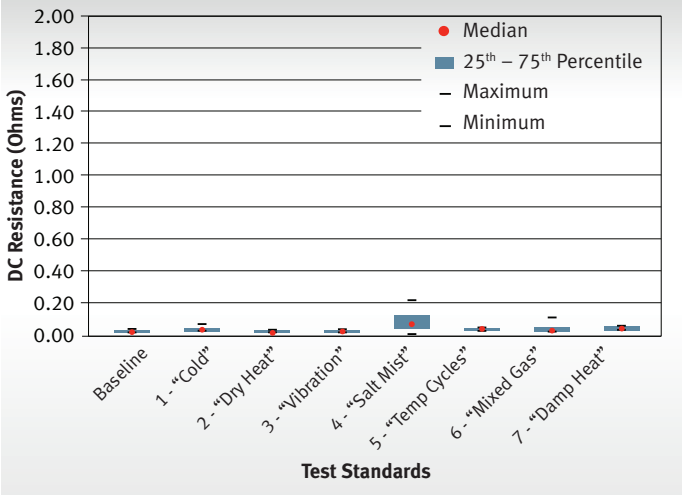


Figure 8: DC Resistance through ALT for 0.84 mm SMT GS5200 Series Parts

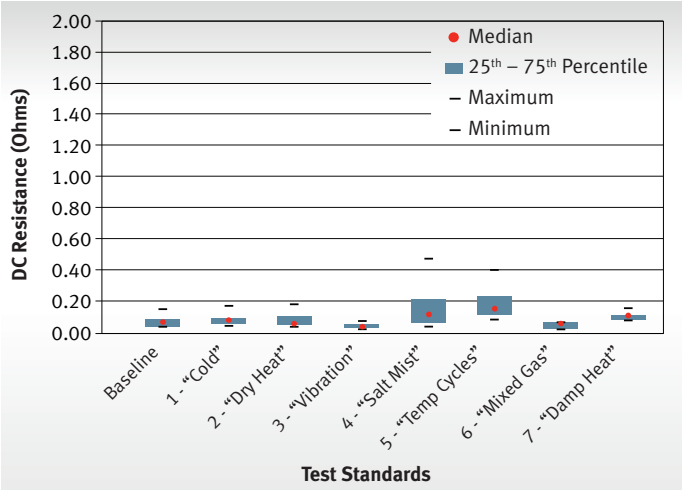
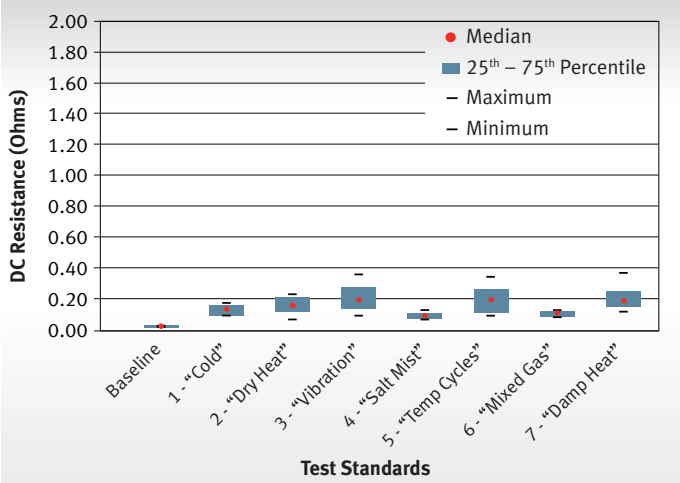


Figure 9: DC Resistance through ALT for 1.30 mm SMT GS5200 Series Parts



Force Displacement Resistance of SMT GS5200 Series

The SMT GS5200 Series provides conductivity when compressed approximately ten percent of the initial height; however, the amount of force and DC resistance differs for each variant as seen in Table 4 and Figures 10-13.

Figure 10: Force Displacement Resistance for 0.50 mm SMT GS5200 Series Parts

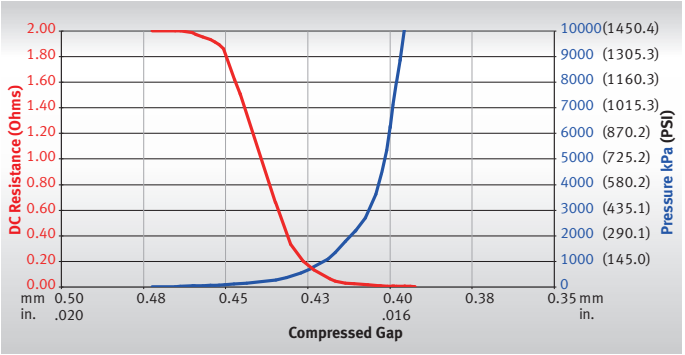


Figure 11: Force Displacement Resistance for 0.72 mm SMT GS5200 Series Parts

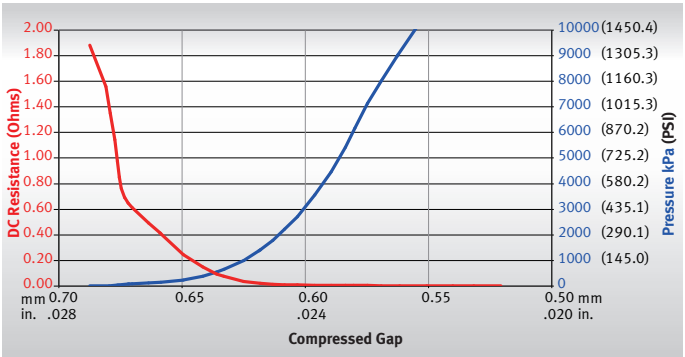


Figure 12: Force Displacement Resistance for 0.84 mm SMT GS5200 Series Parts

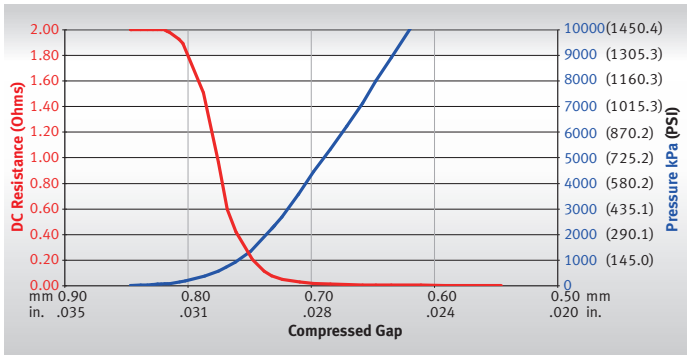
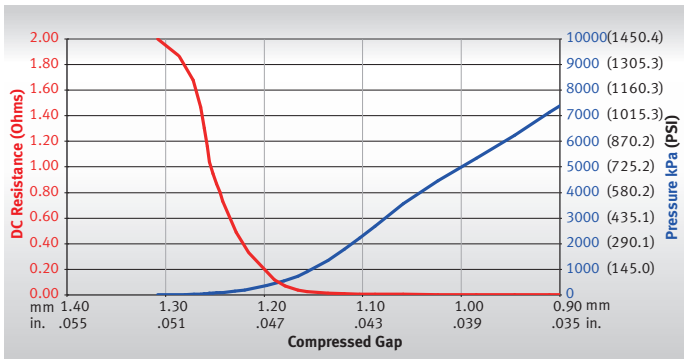


Figure 13: Force Displacement Resistance for 1.30 mm SMT GS5200 Series Parts



Ordering Information for GORE® SMT EMI Gaskets and Grounding Pads

GORE® SMT EMI Gaskets and Grounding Pads are available in standard sizes of lengths, widths, and thickness. For assistance in selecting the right components for your application, please contact our authorized distributor:

Richardson, RFPD (richardsonrfpd.com)

1-800-737-6937 • rfpdsales@richardsonrfpd.com

GORE® SMT EMI Gaskets and Grounding Pads

GORE® SMT EMI Gaskets and Grounding Pads are covered by patent No. US 6,255,581 B1 and US 6,210,789 B1. Corresponding foreign patents issued.

GORE® SMT EMI Gaskets and Grounding Pads - SMT Supersoft Series is covered by patent No. US 6,255,581 B1 and US 7,129,421 B2. Corresponding foreign patents issued.

NOTICE — USE RESTRICTIONS APPLY
Not for use in food, drug, cosmetic or medical device manufacturing, processing, or packaging operations.

W. L. Gore & Associates, Inc.

gore.com/emi

Creative Technologies Worldwide

Gore-Shield®

SMT EMI GASKETS

Unique Surface-Mountable Solution

Technical Summary

GORE-SHIELD® SMT EMI Gaskets are electrically conductive EMI gasket building blocks. They are comprised of a conformable electrically conductive gasket material bonded to a thin, solderable metal support layer via an electrically conductive adhesive. The gasket material consists of a polytetrafluroethylene (PTFE) matrix loaded with highly conductive nickel-based particles. The parts are precision cut to standard lengths and widths and packaged in standard EIA tape-and-reel format for automated PCB placement using existing surface mount equipment. They are soldered to the PCB via standard reflow processes along with the other board components.

By piecing together a series of blocks of identical or varying lengths on the PCB ground trace, a simple and efficient EMI seal can be formed between the PCB and corresponding shield housing. This enables users to create a low cost, custom EMI gasket at the board level without special tooling or custom installation equipment.

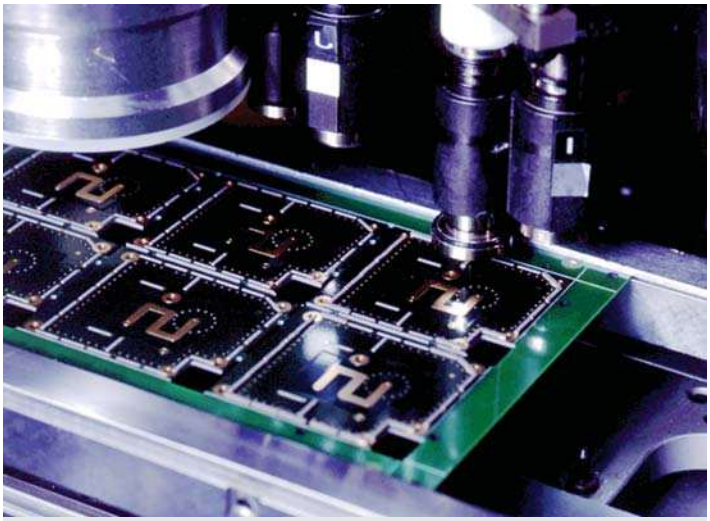
GORE-SHIELD® SMT EMI Gasket building blocks have been developed to help suppress unwanted electromagnetic radio frequency interference in both portable and non-portable electronic devices where inter-cavity shielding is critical.

Design Data

EMI gasket performance is crucial for many designs. The key factors to look for in a gasket include how it performs after Accelerated Life Testing (ALT) and how it performs after opening and closing of the gasketed seal (some gaskets only work once). It is important to note that measuring a low DC resistance value for an EMI gasket will not guarantee a high RF shielding value. This is because several other factors have to be taken into account when designing for a good EMI shield. Factors such as controlled gasket thickness/flatness, gasket conformability, contact area, conductive particle distribution, mechanical properties of the enclosure, etc., all play an integral role in good EMI performance.

Designing GORE-SHIELD® SMT EMT Gaskets for the PCB shield is very simple. Gore application engineers can quickly advise how to lay out the gasket design to optimize the number of GORE-SHIELD® SMT EMI Gasket pads required.

Please contact Gore for additional information.



Benefits

- Low cost EMI gasket solution
- High shielding effectiveness
- 8-10 parts / second assembly time
- Quick design cycles
- Flexible design allowing cost reduction
- Available in standard EIA tape-and-reel packages
- No curing required
- Standard part sizes
- Repairable
- Flame retardant
- Simplified supply chain
- Standard PCB component
- Consistent, repeatable installation
- Compatible with standard and lead-free solder reflow
- Survives multiple reflow operations

Covered by Patent No.: US 6,255,581 B1
US 6,210,789 B1
Corresponding Foreign Patents issued and pending

Gore-Shield®

SMT EMI GASKETS

GORE-SHIELD® SMT EMI Gasket Standard Parts

Nominal properties (mm unless otherwise specified)

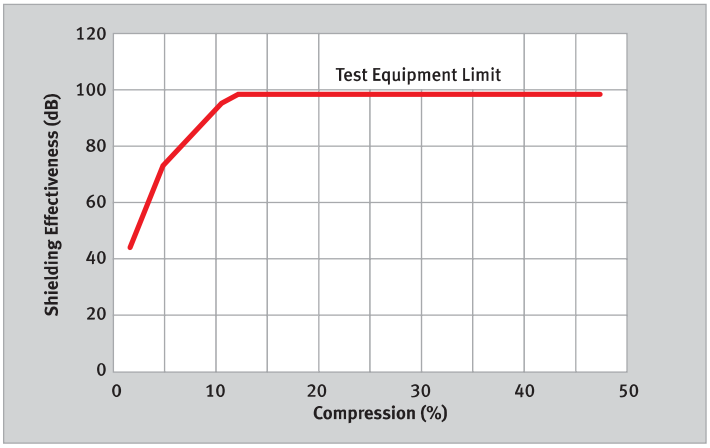
GORE Part Number 25SMT-3645-	Length	Width	Thick.	Carrier Tape Width x Pitch	Parts per Reel	Resist. at RCS (mOhm)
9	5.50	1.25	0.65	12x4	15,000	2.0
10	8.00	1.25	0.65	16x4	15,000	2.0
13	5.50	1.25	0.45	12x4	15,000	2.0
14	8.00	1.25	0.45	16x4	15,000	2.0
17	5.50	1.10	0.65	12x4	15,000	2.0
18	8.00	1.10	0.65	16x4	15,000	2.0
21	5.50	1.10	0.45	12x4	15,000	2.0
22	8.00	1.10	0.45	16x4	15,000	2.0
25	12.00	2.00	0.65	24x4	15,000	2.0
26	8.00	2.00	0.65	16x4	15,000	2.0
27	5.50	2.00	0.65	12x4	15,000	2.0
33	3.20	1.10	0.65	12x4	15,000	3.0
34	5.50	0.90	0.45	12x4	15,000	2.0
35	8.00	0.90	0.45	16x4	15,000	2.0
40	5.50	1.25	0.80	12x4	10,000	2.0
41	3.20	1.25	0.80	12x4	10,000	4.0
43	3.20	3.20	1.30	12x8	5,000	3.0
44	8.00	2.00	1.30	16x4	7,500	2.0
46	3.20	3.20	2.00	12x8	2,500	2.0
47	8.00	2.25	2.00	16x4	5,000	2.0

Applicable Standards

The following specifications and standards have been used.

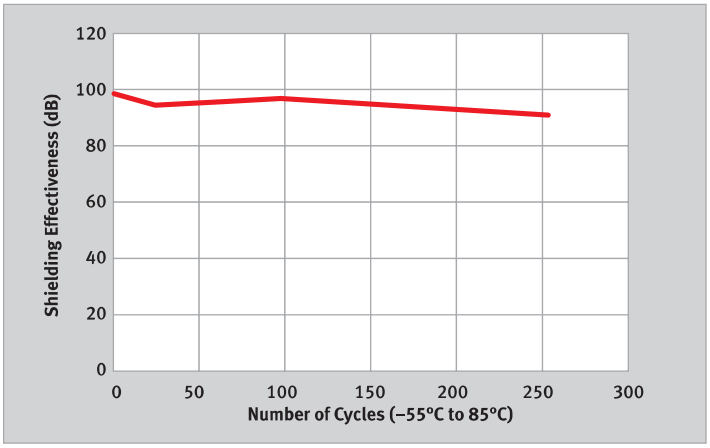
ASTM F36-88	Compressibility of Gasket Material
ARP 1705 (modified)	Shielding Effectiveness Technique for Measurement of EMI Gasket Materials
MIL-G-83528	Shielding Effectiveness Measurement of EMI Gasket Material

GS5200-Shielding Effectiveness vs. % Compression



Performed in accordance with ARP 1705 (modified as a transfer impedance test).

Shielding Effectiveness Through Accelerated Life Testing (ALT)



Tested in accordance with ARP 1705 mod at 1 GHz.

RoHS Status

RoHS Material*	Pass/Fail
Lead (Pb) Content	Pass
Cadmium (Cd) Content	Pass
Hexavalent Chromium (Cr6) Content	Pass
Mercury (Hg) Content	Pass
Bromine Compounds	Pass

*W. L. Gore & Associates declares that we do not intentionally add substances listed in Directive 2002/95/EU to GORE-SHIELD® SMT EMI Gaskets. Independent lab tests have been performed and results are available upon request.

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GORE® SMT EMI Gaskets and Grounding Pads

Design Guide

Design Guide

GORE® SMT EMI Gaskets and Grounding Pads combine unsurpassed conductivity with the convenience of SMT-compatible format. Their compatibility with SMT equipment helps reduce total costs because these off-the-shelf components eliminate the need for custom designs that can increase engineering costs. Also, no secondary processing is required, which reduces equipment and labor costs during production. Using precise SMT equipment to incorporate GORE® SMT EMI Gaskets and Grounding Pads improves the consistency and repeatability of printed circuit board (PCB) assembly. When compared to manual installation and dispensing methods typically used for other EMI shielding materials, GORE® SMT EMI Gaskets and Grounding Pads decrease waste.

GORE® SMT EMI Gaskets and Grounding Pads offer a full spectrum of working ranges, making them ideal for use as grounding pads, EMI gaskets, and antenna contacts. Gore offers two types of SMT materials:

- The highly compressible SMT Supersoft Series that requires minimal force for initial conductivity (Figure 1)
- The SMT GS5200 Series that delivers the highest conductivity under compression (Figure 2) in Gore's EMI Shielding product line.

Application engineers are available to help determine the right components for your application and to identify the characteristics for successful integration. To ensure maximum performance of GORE® SMT EMI Gaskets and Grounding Pads, you need to evaluate the constraints of your application during design, start-up, on-going operations, maintenance, and storage.

Design Guidelines

Specific attributes of the gaskets ensure that the SMT process is successful and that the gaskets provide long-lasting, reliable performance. If you are using GORE® SMT EMI Gaskets and Grounding Pads for grounding, the design considerations are the same as for any SMT component. For EMI shielding or grounding, you need to ensure you have a high level of conformance, including sufficient PCB area to accept the component, and whether a standard product will meet the needs of your application. Also, you should review the manufacturing guidelines for SMT, such as available board space, recommended solder mask opening, gap, and compressive force available/required.

Board Layout

GORE® SMT EMI Gaskets and Grounding Pads can be used for grounding in discrete locations. The amount of space available on the board and the requirements of the mating surface determine the x/y dimensions of the gasket and its location on the board in reference to the interfacing surface. Because GORE® SMT EMI Gaskets and Grounding Pads can be configured with one another like building blocks, they are easy to incorporate onto a board without requiring a custom-configured gaskets. GORE® SMT EMI Gaskets and Grounding Pads can also be used to create a Faraday cage by enclosing a component or board section. For detailed information about the recommended pad size and physical characteristics for each SMT Series part, see the Ordering Information sheet with this document.

Figure 1: SMT Supersoft Series

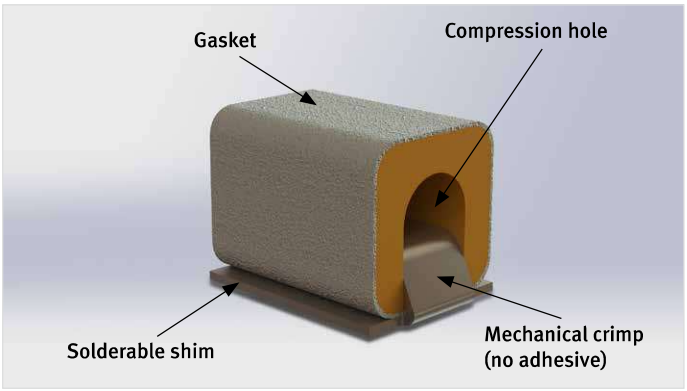

Figure 2: SMT GS5200 Series

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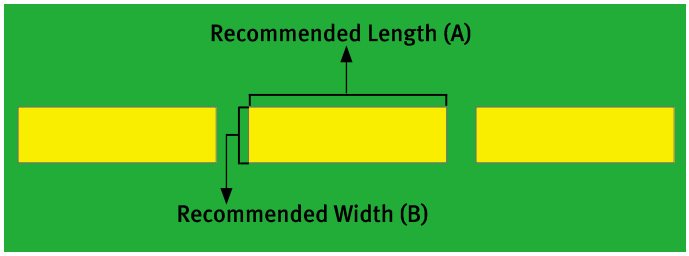
Recommended Solder Mask Opening

The recommended width for the solder mask opening is approximately ten percent greater than the width of the SMT part itself (Figure 3). For example, a part that is 1.25 mm wide should have a solder mask opening of 1.375 mm. This allows for a small solder fillet to form between the ground trace and the shim. For recommended length and width of solder mask openings for specific SMT Series parts, see the Ordering Information sheet with this document.

Figure 3: Recommended Solder Mask Opening



Compressive Force

The amount of force available to initiate contact, the physical properties of the housing, and the necessary DC resistance required will determine the type of GORE® SMT EMI Gaskets and Grounding Pads to use (Table 1).

Table 1: Recommended SMT Components for Typical Applications

Sample Application	SMT Supersoft Series	SMT GS5200 Series
Interface between PCB and metallized housing or shield can	Yes	Yes
Ground for flexible circuit	Yes	No
Camera module grounding	Yes	No
LCD display grounding	Yes	No

GAP

The amount of space you are trying to fill (the gap) determines the configuration and the working range that will be required from the gaskets. Gore recommends integrating a compression stop to ensure consistent levels of compression. The recommended service height for the various products in the SMT Series differs because of their unique constructions (Figures 4 and 5).

Figure 4: Recommended Service Heights for SMT Supersoft Series

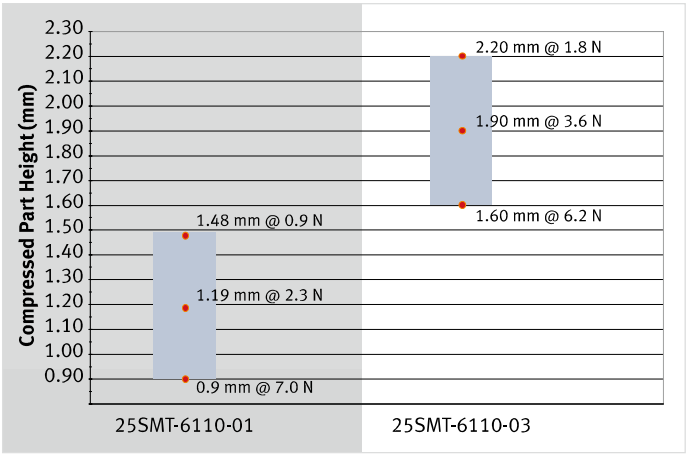


Figure 5: Recommended Service Heights for SMT GS5200 Series