

design THERMAL GAP PAD® FAQs

FREQUENTLY ASKED QUESTIONS

What are Gap Pads?

A Gap Pad is a thermally conductive elastomer material that sits between two surfaces to conduct heat away from devices such as power semiconductors or high-power LEDs.

Why use Gap Pads?

A Gap Pad minimizes the thermal resistance of the joint between two surfaces and thus can help keep the junction temperature of a power device within its operating limits. Moreover, it conforms to surfaces that do not align well, eliminating air gaps at the interface. As an electrical insulator, it resists punctures, shears and tears.

How do you pick a Gap Pad for a particular application?

A Gap Pad can be characterized by its thermal, electrical, and elastomeric qualities. Thermal qualities refer to thermal conductivity, thermal resistance, and thermal impedance. Heat transfers faster across materials of high thermal conductivity. Thermal conductivity depends on temperature. Typically, the thicker the gap to fill, higher thermal conductivity becomes more necessary.

Thermal resistance measures the degree to which a material resists a heat flow. It is the reciprocal of thermal conductance.

Thermal impedance is a measure of total resistance to heat flow between a hot and cold surface via the thermal interface materials (Gap Pad). It includes area and interfacial resistance whereas

thermal resistance does not.

How do you measure the thermal performance of a Gap Pad?

Thermal performance of a Gap Pad can be calculated from the thermal impedance. The thermal impedance is typically the sum of the Gap Pad thermal resistance plus the thermal resistance of its interfaces with the heat sink and heat source.

How do you measure the electrical performance of a Gap Pad?

The dielectric breakdown voltage defines the maximum voltage difference a Gap Pad can stand before it collapses and conducts. Breakdown voltage can also be converted to dielectric strength by dividing it by pad thickness (V/mm).

The volume resistivity refers to how well a Gap Pad reduces the flow of electric leakage current. A low resistivity indicates a material that readily allows the movement of electric charge.

The dielectric constant is the relative permittivity of a dielectric material and reflects the extent to

which it concentrates electrostatic lines of flux. It is the ratio of the electrical energy a material stores at an applied voltage, relative to that stored in a vacuum. It is given for a specific frequency.

What physical qualities are important for Gap Pads?

Compression and deflection are among the most important. Gap Pad materials behave like highly filled elastomers. Variables that contribute to compression/deflection can be classified as stress (pressure) or strain (deflection). Compression/deflection qualities depend on various parameters such as pad thickness, surface area, rate of deflection, etc.

Because they are viscoelastic, Gap Pads behave in a nonlinear, non-Hookean fashion under a constant strain. Application of a compressive load causes an initial deflection followed by a slow relaxation. The process continues until the compressive load is balanced by the cohesive

strength of the Gap Pad.

Compression set refers to the permanent deformation remaining in the Gap Pad after a compressed force is removed. It's the result of the stress relaxation. After an extended exposure to compressive force, part of the Gap Pad deflection becomes permanent and the pad will not recover after the compressing load disappears.

How do you size a Gap Pad based on dimensional tolerances?

Mainly, the user must account for growth in x-y direction as the pad deflects from the original thickness. This quality may be important if an obstacle prevents the pad from expanding.

What are the assembly considerations for Gap Pads?

The mounting system determines the pressure needed to compress the Gap Pad with minimum contact resistance and without damage to the components. Hence, the Gap Pad must be able to accommodate the amount of pressure for compression in high-stress applications. Rate of compression is another consideration. The speed of compression rises with pressure.

Other considerations include the necessity for a tack or non-tack or adhesive surface, high durability for cut-through resistance, electrical isolation, compliance with UL and RoHS, and whether color or shelf life is important. Also, liquid thermal interface materials may have outgassing issues that are absent when using Gap Pads.



Bergquist S-Class Gap Pad® 5000S35 Is Your Solution.



Gap Pad 5000S35's natural tack makes application clean and easy to handle.

Gap Pad S-Class is perfectly suited for high performance applications such as VRMs, BGAs and ASICs.

Bergquist's Gap Pad 5000S35 is the perfect combination of softness, low thermal resistance and high thermal conductivity. With a low bulk hardness (35 Shore 00) and high thermal conductivity (5.0 W/m-K) it conforms to demanding contours while maintaining its structural integrity. It is an ideal gap filling solution for applications with fragile components that can be damaged by harder materials that cause higher mounting pressure on components. Gap Pad 5000S35 is also an excellent solution for DVD drives, memory modules, and PC boards to chassis.



Excellent interfacing and wet-out makes GP 5000S35 ideal for fragile components with demanding contours and stack-up tolerances.

Ultra soft S-Class integrity offers easy application.

Gap Pad 5000S35 has a natural tack that eliminates the need for additional adhesive layers that can inhibit thermal performance. Its super soft, yet elastic nature provides excellent interfacing and wet-out, even to surfaces with high roughness or topography. Gap Pad 5000S35 features an embedded-fiberglass reinforcement that makes it puncture, shear and tear resistant. No tearing, flaking or crumbling – just clean and easy handling during the assembly process.

FREE S-Class swatch kit.

Visit our web site or call to qualify for your FREE S-Class swatch kit with product details.

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