Reliability that Sticks:
Thermal Adhesive Films Offer Outstanding Performance in Easy-to-Use Format

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When considering which thermal management materials are the right products for the task, top-of-mind are usually greases, pastes or pads. Are they always the best solution, though, or just the most well-known? For certain applications, there's one class of materials that may be more suitable than any of the more common thermal management products. In fact, these materials may be the ONLY solution in some cases. We're talking about thermal adhesive films (often referred to as assembly adhesive films) and their advantages are many, especially when there is a requirement for bonding large areas or complex parts together.

Though thermal adhesive films are most often found in the defense and automotive markets, the advantages they deliver can extend to any application where robust thermal and electrical performance, void free bond lines and controlled thicknesses are required. For certain products, thermal adhesive films are quite simply the only thermal management solution. Take, for example, large (6" x 6" or larger) printed circuit board (PCBs) that must be bonded to a heat sink. Printing paste evenly across a surface this large is challenging at best, and will almost certainly result in an uneven bond line and/or voids in the material. These types of problems can be catastrophic for some applications and highly problematic for others. Uneven material distribution can lead to inconsistent heat transfer and spotty electrical performance, both of which can affect the work life of components on the assembly and the overall reliability of the product. The larger a device is, the more difficult it becomes to guarantee a void free bond line with a paste material, as its dependence on precise pressure to develop the bond line also adds an element of uncertainty – particularly for larger devices. Thermal adhesive films, however, eliminate all of these concerns. Supplied in custom, pre-cut formats for the applications in which they will be used, films aren't subject to the same flow concerns associated with pastes. The film is placed onto the backside of the device, aligned and attached to its heat sink or chassis, following which pressure and heat is applied to cure the material. Films are remarkably simple to use and the reliability they provide is, in many cases, superior to alternative products.

Though most frequently used for large form factor base station telecom boards, big integrated circuit boards used in satellites or defense applications such as radar systems, thermal adhesive films aren't limited to larger product sets. Manufacturers of smaller, highly complex devices also find that films deliver a far more elegant, reliable and user friendly alternative to paste-based mediums. As compared to thermal paste adhesives, films offer a cleaner, no-waste, easily processed solution with a lower total cost of ownership. And, when it comes to stacking up against solder as a thermal solution, films also prove their superiority for certain applications. As stated previously, films provide void free adhesion over large surface areas – something solder can't do – and enable a lower stress interface. What's more, thermal

adhesive films are processed at a lower temperature than solder, enabling the use of temperature-sensitive components without the risk of damage. Because of these distinctions, manufacturers of many microwave applications (RF telecom and radar, for example) have already replaced solder with thermal adhesive films.

As the leader in thermal film formulation technology, Henkel has developed a wide variety of film materials for multiple applications. Whether you're seeking high thermal conductivity, electrical conductivity, insulation performance or a combination thereof, Henkel has a thermal film solution for just about any application. Some of our more well-known materials include:

Electrically and Thermally Conductive

EMERSON & CUMING CF3350 – Ideally suited for RF applications, this silver-filled material offers electrical conductivity and 7 w/mK of thermal conductivity in a strong adhesion formula.

Thermally Conductive and Electrically Insulating

ABLESTIK ABLEFILM 561K – ABLEFILM 561K provides outstanding adhesion strength for bonding mismatched coefficient of thermal expansion (CTE) materials.

ABLESTIK ABLEFILM 550K – This material offers excellent thermal conductivity in highly enhanced electrically insulating formulation, supported by a fiberglass adhesive structure.

So, if greases, pastes or pads aren't satisfying your requirements for void-free, consistent bond lines, high reliability and excellent thermal and/or electrical performance, consider thermal adhesive films from Henkel. You may wonder how your operation ever got along without them!

For more information, log onto www.henkel.com/electronics or call 714-368-8000.