

52°C Thermaps

**Thermal Rod Applicators (52°C)
for manual or high speed component-heat sink attachment**



Advantages:

- ?? High Speed automated attachment of components to heat sinks (or PC boards). Very low equipment investment
- ?? Can also be used for prototype work
- ?? Lowest available thermal resistance:
0.03°C/W/in² at 4.5psi
- ?? Differential Phase Change allows one or two phase operation
- ?? Controlled sub micron particulate morphology for superior void filling
- ?? Organo-metallic wetting action promotes lamellar flow
- ?? Controlled Thixotropicity eliminates migration
- ?? Thermoplastic adhesion can eliminate fasteners
- ?? Reversible Adhesive Bond (RAB) characteristic eliminates out gassing
- ?? Environmentally friendly/Non-Toxic/UL approved
- ?? Easy to use/Manufacturing Friendly

Note: This thermal material is not electrically conductive but contains no substrate to prevent metal to metal contact between component and heat sink.

Thermaps thermal materials do not require high mounting forces. Typically 4.5 psi is quite sufficient. Clips can be used to hold the semiconductor in place. Since only low mounting forces are required, it is practical to contact large surface areas.

Description:

Thermaphase "Thermaps" are solid rods of thixotropic (FSF-52) material which can be used for manual or automatic attachment of components to heat sinks (or PC boards).

When the rod material is touched briefly to a heated surface, this thermal interface material becomes a soft thixotropic substance. The molten thermal material adheres to the heated surface when the Themap is removed. When a component is pressed down into the molten material, it flows into the micropores of component and heat

sink, expelling air from the pores. The distance between component and heat sink decreases as the thermal compound flows into the pores and surface irregularities. Excess FSF material is extruded from under the component and forms a "bead" of material around the perimeter of the component. The thinnest possible interface is created. The excess material at the component perimeter forms a seal around the component. Thermaphase FSF material is not electrically conductive, but has no barrier in it to prevent metal to metal contact between component and heat sink.

This material is Thermoplastic and exhibits RAB (Reversible Adhesive Bonding). When the material has reflowed under heat and pressure and then recools below the phase change temperature, it bonds the component to the heat sink. The component can be removed at any time by reheating. This can be done an unlimited number of times. This product feature can be used to adhere components to heat sinks replacing mechanical fasteners.

You can use these "Thermaps" for prototype work by simply "painting" pads onto heat sinks or other flat surfaces. For production work, the "Thermaps" is brought down vertically each time and prints the heat sink with a thermal pad similar to the rod cross sectional shape. The tip of the rod retains its cross sectional shape because the thermal material is thixotropic, non-flowing. When the component is pressed onto the heat sink and the thermal interface material allowed to change again to the solid state, the component is firmly adhered to the heat sink (tensile strength >25psi).

Typical Characteristics

Thermal Characteristics	Units	Thermaps 52°C
Overall Thermal Resistance at 4.5 psi. See graph of Thermal Resistance vs. Closure Force (See Test Procedure)	°C/W/in ²	0.03 at 4.5psi 0.02 at 15psi
Thermal Conductivity of Thermaphase compound	W/M ² /K	0.63
Phase Change Temperature	°C	52
Use Temperature	°C	-60 to +200
Mechanical Characteristics	Units	Thermaps 52°C
Standard Rod	mm	12.7x12.7x203
Viscosity (Thermaphase compound) at 150°C	Poise	>100
Density of Thermaphase compound	g/cc	2.1
Electrical Characteristics	Units	Thermaps 52°C
Volume Resistivity*	? -cm	10 ¹⁴
Dielectric Strength	Volts AC	375 per mil
* This material is not electrically conductive, but contains nothing to prevent component to heat sink mechanical/electrical contact.		

How to Use:

Thermaphase "Thermaps" are a simple, easy to use solution for attaching components to heat sinks or to circuit boards. Touch the "Thermaps" tip perpendicular to a hot surface (heat sink for example), touch the rod to the surface, and it creates an instant thermal pad. While still molten, the component is pressed against the heat sink.

For manual prototype work, larger pads can be made by simply holding the rod perpendicular to the heat sink surface and moving it over the heated heat sink to create the desired shape. For automated applications, rods of the desired shape/size can be supplied that will create the pad size/shape by simply touching the

rod to the heat sink surface. As soon as the heat sink cools below the phase change temperature, the FSF-52 compound resolidifies and the component is adhered to the heat sink. The tensile strength of the bond is 25 psi up to about 48°C. This attachment technique can be used to adhere the component to the heat sink for shipment. If your equipment operates at a temperature lower than 48°C, you can avoid the use of mechanical fasteners since the component will remain adhered to the heat sink. If your equipment operates at a temperature less than 80°C, you can use FSF-98 or 98°C "Thermaps" in this same way. See FSF-98 "Thermaps" data sheet.

For high speed automated component attachment, the rods are mounted in a holder. Preheated heat sinks are conveyed under the rod holder. The rod is automatically brought down perpendicular to the heat sink and touched briefly to the pre-heated heat sink surface. This creates the molten thermal pad. The heat sink then moves to the next station where the component is pressed onto the heat sink. When the thermal material returns to the solid state, the component is adhered to the heat sink.

The attachment method described above makes it possible to eliminate labor intensive operations in low labor cost markets with the attendant communication, and travel problems. It provides a high speed method for the manufacturer to attach components in his own plant.

Product Availability:

Rods are available in standard sizes. For specialized applications, any required shape of rod can be supplied.

Standard Thermaps 0.5" x 0.5" x 8" long

Special shapes, sizes, available on special order.