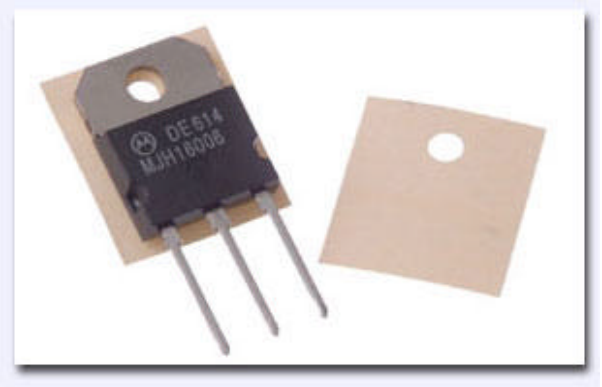
Orcus Datasheets

**Thermaphase on Kapton® 52ºC**

(Thermally Conductive Electrical Insulators)




**Advantages:**

- Lowest available thermal resistance:0.04°C/W/in² at 4.5psi(MTI)
- Low mounting force so you can use clips, not screws
- Differential Phase Change Characteristic allows one or two-phase operation
- Controlled particulate morphology for superior void filling
- Organo-metallic wetting action promotes laminar flow
- Controlled Thixotropicity eliminates migration
- Thermoplastic adhesion can eliminate fasteners
- Reversible Adhesive Bond (RAB) characteristic eliminates outgassing
- Easy to handle - "manufacturing friendly"
- Excellent solvent resistance
- Precision metered coating 0.5 to 6.0 mils thick
- Available with different compound thickness on each side of Kapton
- Environmentally friendly/Non Toxic/UL Approved
- Available with Zero DT adhesive backing
- Dielectric strength up to 11000 Volt

**Description:**

This product consists of Dupont Kapton polyimide film, precoated on both sides with **ORCUS** Thermaphase Differential Phase Change Material. The material is dry-to-the-touch and flexible at room temperature. This is the original material that started the Differential Phase Change Material revolution years ago. When placed between two rigid, rough, uneven surfaces and heat (>52°C) and pressure (4.5psi) are applied the following occurs:

1) When the heat exceeds 52°C (either from electronic component heat-up or because of externally applied heat) the Thermaphase material becomes a soft, thixotropic consistency.

2)The physical pressure on the component causes the Thermaphase material to flow into the micropores of the component and heat sink, expulsing air from these pores. The distance from the component to the Kapton and from the Kapton to the heatsink decreases as the Thermaphase material enters the pores and surface irregularities. Excess 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.

3) The Kapton provides electrical insulation. The Thermaphase compound provides a

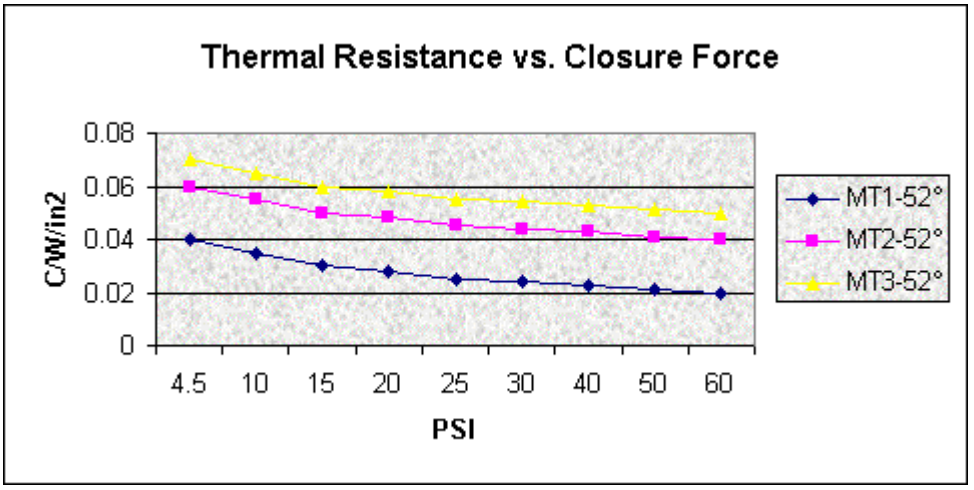
heat transfer medium that fills the surface pores of component and heat sink.

This material is Thermoplastic and exhibits Reversible Adhesive Bonding (RAB). When the material has reflowed under heat and pressure between component and heat sink and then recools below the phase change temperature, it holds the component and heat sink together. By reheating the material again beyond its reflow temperature, you can reverse the adhesion and separate the component and heat sink. These process can be carried out an unlimited number of times. This product feature can be used to adhere components and heatsinks to replace mechanical fasteners.

**Typical Characteristics:**

| **Thermal Characteristics** | **Units** | **1 mil Kapton** | **2 mil Kapton** | **3 mil Kapton** |
|---|---|---|---|---|
| Overall Thermal Resistance at 4.5 psi. See graph of Thermal Resistance vs Closure Force (See Test Procedure) | °C/W/in$^2$ | 0.04 | 0.06 | 0.07 |
| Thermal Conductivity of Kapton Substrate | W/M$^2$/K | 0.45 | 0.45 | 0.45 |
| Phase Change Temperature | °C | 52 | 52 | 52 |
| Use Temperature | °C | -60 to +200 | -60 to +200 | -60 to +200 |
| **Mechanical Characteristics** | **Units** | **1 mil Kapton** | **2 mil Kapton** | **3 mil Kapton** |
| Substrate Material | ---- | MT Polyimide | MT Polyimide | MT Polyimide |
| Substrate Thickness | inches | 0.001 | 0.002 | 0.003 |
| Coating Thickness | mils | 0.5 to 6.0 mils | 0.5 to 6.0 mils | 0.5 to 6.0 mils |
| Moisture Absorption (substrate) | % | 5 | 5 | 5 |
| Viscosity (Thermaphase compound) at 150°C | Poise | >100 | >100 | >100 |
| Density of Thermaphase Compound | g/cc | 2.1 | 2.1 | 2.1 |
| **Electrical Characteristics** | **Units** | **1 mil Kapton** | **2 mil Kapton** | **3 mil Kapton** |
| Volume Resistivity (substrate + thermal coating) | ? -cm | $10^{14}$ | $10^{14}$ | $10^{14}$ |
| Dielectric Strength | Volts AC | 3900 | 7800 | 11000 |
| Dissipation Factor | ---- | 0.003 | 0.003 | 0.003 |
| Dielectric Constant (1KHz/50% humidity) | % | 5 | 5 | 5 |

Thermaphase on Kapton does 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. Use the thinnest Kapton material possible that will provide the dielectric strength and mechanical resistance you need.




**Thermal Resistance versus Closure Force**

**OPTIONS:**

1) Thickness of Kapton can be 1, 2, or 3 mils thick.
The thicker the Kapton, the higher the dielectric strength
The thicker the Kapton, the higher the cost
The thicker the Kapton, the higher the Thermal Resistance
The thicker the Kapton, the greater the mechanical resistance to "cut-through"

2) The thickness of the Thermaphase coating can be varied from 0.5 mils up to 6 mils per side
The coating thickness can be different on the two sides of the Kapton. This is useful if you have a very smooth, flat electronic component on one side and a rough, uneven heatsink on the other side.

3) This material is available with **ORCUS'** unique Zero ?T Fiberized Pressure Sensitive Adhesive (FPSA) which does not increase thermal resistance.

4) Available with **ORCUS'** unique Zero ?T Repositionnable Thermal Adhesive (PSTA) which allows adjusting position of the part after it is applied to the heat sink.

**How to Use:**

Place Thermaphase on Kapton material on heat sink. Install component using clips, screws, spring-loaded screws, or Belleville washers. Use at least 4.5psi of closure force during initial reflow of Thermaphase compound. Heat component/heat sink by using component operating temperature, or externally applied heat. You can use more or less than 4.5 psi closure force. The thermal resistance decreases with increasing closure force. (See graph above).

**Product Availability:**

Standard Sheets: 12" x 12"
Standard rolls: 12" x 500 ft.
Standard die-cut parts: Pads for all standard case sizes are available. Contact us for outline drawings of standard parts. We have cut thousands of special die-cut parts.

For detailed information on "Specials", we will be pleased to assist you in selecting the material having the best thermal, electrical, and mechanical characteristics.