



Products / Interface Materials / Greases

## Thermal Greases

» **Sil-Free™ RoHS Compliant**

silicone-free synthetic thermal grease

» **Ther-O-Link RoHS Compliant**

silicone-based thermal grease

» **Ultrastick RoHS Compliant**

silicone-free solid phase change compound in convenient application bar

» **Conducta-Cote™ RoHS Compliant**

Conductive thermal grease on a pre-coated alum carrier

» **Thermalcote™ RoHS Compliant**

silicone-based thermal compound in a synthetic base fluid for efficient application

» **Thermalcote™II RoHS Compliant**

silicone-free thermal compound in a synthetic base fluid for efficient application

## Sil-Free™

Sil-Free™ 1020 is a metal-oxide-filled, silicone-free synthetic grease specially formulated to enhance heat transfer across the interface between the semiconductor case and the heat sink without the migration or contamination associated with silicone-based products.



Dry interface case-to-sink thermal resistance is typically reduced 50% to 75% with proper application of Sil-Free™ 1020.

This virtually "no-bleed", high-performance compound will not dry out, harden, melt, or run, even after long-term continuous exposure to temperatures up to 200°C. Even in a vacuum atmosphere (10<sup>-5</sup> Torr, 24 hours@100°C), Sil-Free™ 1020 exhibits virtually "no bleed" or evaporation.

## Thermalcote

Thermalcote™ is a superior thermal joint compound of thermally-loaded silicone-based grease for use with all heat sinks. It improves the transfer of thermal energy across the metal-to-metal interfaces between the transistor or rectifier case and the heat sink.

Thermalcote conducts heat approximately 15 times better than air and more than 4 times better than unloaded silicone grease. It is non-toxic, extremely stable, and neither cakes nor runs from -40° to 204°C (-40°F to 399°F).

### Thermalcote Resistance Calculator

Enter the area of the device that will contact the heat sink:	mm <sup>2</sup>
Enter the grease thickness:	mm
<b>Interface Resistance =</b>	







### Formula

$$\text{interface resistance} = \frac{\text{interface thickness (mm)} * 1000}{\text{thermal conductivity (W/m-K)} * \text{contact area (mm}^2\text{)}}$$

<b>Color</b>	Opaque White
<b>Operating Temperature Range</b>	-40°C to 204°C (-40°F to 399°F).
<b>Thermal Conductivity</b>	0.765Wm <sup>-1</sup> °C <sup>-1</sup> (0.442 Btu/hr ft °F)
<b>Dialectic strength 1.27 mm gap(0.050" gap)</b>	11.8 x 10 <sup>3</sup> volts/mm (300volts/mil)
<b>Cleaning solvent</b>	Mineral Spirits or Turpentine
<b>Specific gravity</b>	1.6
<b>Evaporation, 24 hours@200°C (392°F), wt%</b>	1
<b>Shelf Life</b>	Indefinite <sup>1</sup> (unopened) One Year (opened)

(1) It is recommended that the containers be turned over every 6 months to minimize settling for ease of mixing.

### Ordering Information

Part No.	RoHS	PCN	Net Weight
249			28 grams (1 oz) tube
250G			57 grams (2 oz) tube
251G			.45Kg. (1 lb) can

**MATERIAL SAFETY DATA SHEET**

PRODUCT NAME: THERMALCOTE I

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**SECTION 4 - FIRST AID MEASURES**

INHALATION: Remove affected person to fresh air; if symptoms persist seek medical attention.

SKIN: Remove contaminated clothing; wash affected area with soap and water; launder contaminated clothing before reuse; if irritation persists, seek medical attention.

EYES: Remove contact lenses. Flush eyes with water for 15 minutes; if irritation persists, seek medical attention.

INGESTION: Give two glasses of water for dilution; DO NOT induce vomiting; never give anything by mouth to an unconscious person; seek medical attention.

**SECTION 5 - FIRE FIGHTING MEASURES**

FLASH POINT (METHOD USED)

610° F (321° C) Cleveland open cup ASTM-D-92

FLAMMABLE LIMITS

LEL: Not applicable

UEL: Not applicable

AUTOIGNITION TEMPERATURE: Not determined

NFPA CLASS: **IIIB**

GENERAL HAZARDS: Product will support combustion. Products of combustion include compounds of carbon, hydrogen and oxygen, including carbon monoxide.

EXTINGUISHING MEDIA

Carbon dioxide, water fog, dry chemical, chemical foam

FIRE FIGHTING PROCEDURES

Firefighters must wear full facepiece self - contained breathing apparatus in positive pressure mode. Do not use solid stream of water since stream will scatter and spread fire. Fine water spray can be used to keep fire - exposed containers cool.

UNUSUAL FIRE AND EXPLOSION HAZARDS

Closed containers can explode due to buildup of pressure when exposed to extreme heat. Do not use direct stream of water on pool fires as product may reignite on water surface. Caution - Material will support combustion!

HAZARDOUS COMBUSTION PRODUCTS

Smoke, fumes, oxides of carbon, zinc and silicone.

**SECTION 6 - ENVIRONMENTAL RELEASE MEASURES**

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: WILL SUPPORT COMBUSTION. Evacuate and ventilate area; confine and absorb into absorbent; place material into approved containers for disposal; refer to SARA Title III, Section 313 40 CFR 372 for details concerning reporting requirements.

**SECTION 7 - HANDLING AND STORAGE**

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Keep container closed when not in use; protect containers from abuse; protect from extreme temperatures, open flames. CAUTION - This material will support combustion. Keep this and other chemicals out of reach of children.

**SECTION 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION****ENGINEERING CONTROLS**

The use of local exhaust ventilation is recommended to control emissions near the source. Provide mechanical ventilation of confined spaces. Use explosion-proof ventilation equipment. See Section 2 for Component Exposure Guidelines.

**PERSONAL PROTECTION:**

RESPIRATORY PROTECTION (SPECIFY TYPE): NIOSH approved respirator designed to remove airborne mists or fume present in excess of maximum allowable concentrations if user operations generate a mist or fume. Refer to 29 CFR 1910.134 or European Standard EN 149 for regulations.

PROTECTIVE GLOVES: Recommended for general protection

EYE PROTECTION: Recommended for general protection

OTHER PROTECTIVE CLOTHING OR EQUIPMENT: Safety eyebath nearby

WORK / HYGIENIC PRACTICES: Practice safe workplace habits. Minimize body contact with this, as well as all chemicals in general.

**MATERIAL SAFETY DATA SHEET**

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**SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES**

VAPOR PRESSURE (MM Hg) 0.12 mm Hg @ 100° C	VAPOR DENSITY (AIR = 1) Not determined
SPECIFIC GRAVITY (WATER = 1) 1.600	EVAPORATION RATE (WATER = 1) Not determined
SOLUBILITY IN WATER Negligible	FREEZING POINT Not determined
pH Not determined	APPEARANCE AND ODOR White paste, mild characteristic odor
BOILING POINT > 500° F (> 260° C)	PHYSICAL STATE Paste
VISCOSITY Not determined	VOLATILE ORGANIC COMPOUNDS (Total VOC's) None

**SECTION 10 - STABILITY AND REACTIVITY**

STABILITY UNSTABLE: STABLE: X	CONDITIONS TO AVOID: Extreme temperatures > 400° F (204° C), open flames
INCOMPATIBILITY (MATERIALS TO AVOID): Strong oxidizing agents	
HAZARDOUS DECOMPOSITION OR BYPRODUCTS: Decomposition will not occur if handled and stored properly. In case of a fire, oxides of carbon, zinc and silicone, hydrocarbons, fumes, and smoke may be produced.	
HAZARDOUS POLYMERIZATION MAY OCCUR: WILL NOT OCCUR: X	CONDITIONS TO AVOID: None

**SECTION 11 - TOXICOLOGICAL INFORMATION**

Hazardous Ingredients	CAS #	EINECS #	LD50 of Ingredient (Specify Species and Route)	LC50 of Ingredient (Specify Species)
Polydimethylsiloxane (b)	63148-62-9	Not found	Not established	Not established
Zinc oxide (as zinc) (a)	1314-13-2	215-222-5	7950 mg / kg Oral - mouse	2500 mg / m3 Inhalation - mouse

**SECTION 12 - ECOLOGICAL INFORMATION**

No data are available on the adverse effects of this material on the environment. Neither COD nor BOD data are available. Based on the chemical composition of this product it is assumed that the mixture can be treated in an acclimatized biological waste treatment plant system in limited quantities. However, such treatment should be evaluated and approved for each specific biological system. None of the ingredients in this mixture are classified as a Marine Pollutant.

**SECTION 13 - DISPOSAL CONSIDERATIONS**

WASTE DISPOSAL METHOD: Dispose of in accordance with Local, State, and Federal Regulations. This product may produce concentrated hazardous vapors or fumes in a disposal container creating a dangerous environment. Refer to "40 CFR Protection of Environment Parts 260 - 299" for complete waste disposal regulations for ignitable materials. Consult your local, state, or Federal Environmental Protection Agency before disposing of any chemicals. Do not flush to sanitary sewer or waterway.

**SECTION 14 - TRANSPORT INFORMATION**

PROPER SHIPPING NAME: Not Regulated

HAZARD CLASS / Pack Group: None / None  
 REFERENCE: Not Applicable  
 IDENTIFICATION NUMBER: None  
 LABEL: None Required

IATA HAZARD CLASS / Pack Group: None  
 IMDG HAZARD CLASS: None  
 RID/ADR Dangerous Goods Code: None  
 Canadian TDG Class / Division: None  
 HAZARD SYMBOLS: None

Note: Transportation information provided is for reference only. Client is urged to consult CFR 49 parts 100 - 177, IMDG, IATA, EC, United Nations TDG, and WHMIS (Canada) TDG information manuals for detailed regulations and exceptions covering specific container sizes, packaging materials and methods of shipping.