Thermal Compound Selection Guide

Silicone-Free Thermal Interface Material

Thermal compound can be packaged in any size Nordson EFD syringe barrel or cartridge along with 6 oz jars and 1 and 5 gallon pails.

Thermal Interface Material (TIM) is any material used to enhance thermal coupling between two parts. TIM may be known by any number of names including thermal compound, thermal grease, thermal gel, heat sink compound, CPU grease, gap filler, and thermal paste. Each is formulated to provide an advantage in specific use conditions. Depending on the materials used, unit price varies from inexpensive to quite high for premium performance.

When two surfaces are placed in contact, surface imperfections cause contact to occur at discrete points, with a relatively low percentage of the nominal area making contact. Thermal compounds are intended to conform to surfaces, filling in the space between discrete contact points. This creates an uninterrupted, thermally-conductive path between surfaces, delivering far better heat-carrying capacity than contact points alone.

Mechanics of Heat Transfer

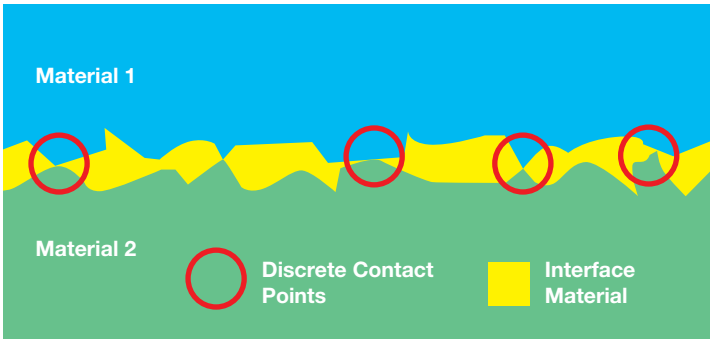
Choosing the best thermal compound requires some understanding of the mechanics of heat transfer and how the thickness of the thermal compound layer, the bond line thickness, influences product choice.

Bond line can be divided into three categories:

- Low, at less than 75 µm
- Medium, from 75 to 250 µm
- High, at greater than 250 µm

There are two critical thermal performance characteristics: Thermal Conductivity (TC) and Thermal Resistance (TR). In low bond line applications, thermal resistance dominates performance. In high bond line applications, thermal conductivity dominates performance. In medium bond line there is a blended influence.

Figure 1. Thermal Conductivity



How thermal compound (interface material) creates an uninterrupted, thermally-conductive path between two materials.

Thermal Conductivity (TC)

TC is a measurement of heat transfer between Material 1 and Material 2, expressed in units of W/mK (see Figure 1). The thicker the layer of thermal compound, the greater the influence of thermal conductivity. Examples: copper 385, steel 50.4, glass 0.80, TIM 0.6-8.0, and wood <0.12.

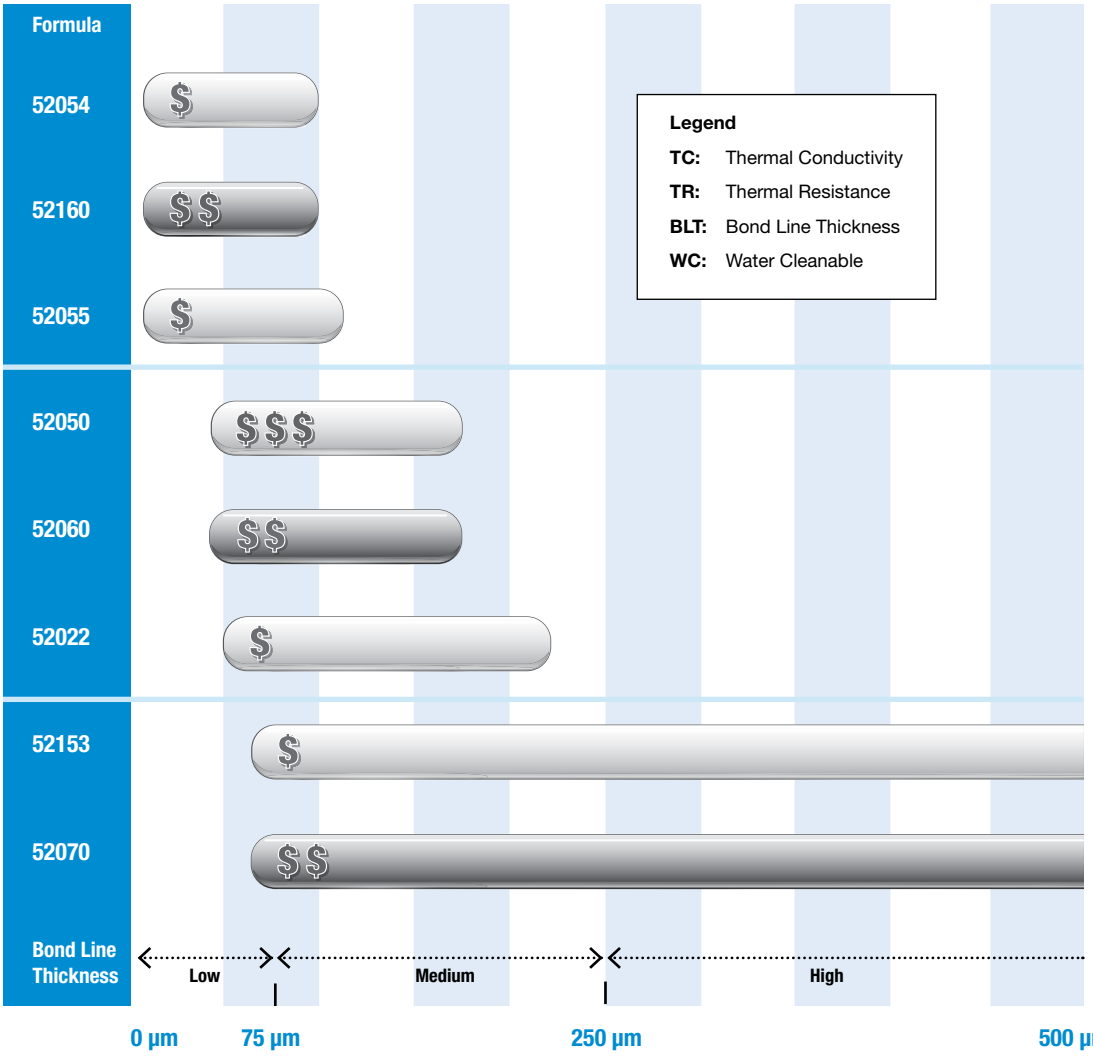
Thermal Resistance (TR)

TR is a measurement of temperature drop across an interface of materials, expressed as °C/W. Thermal compounds that have the best wetting and filler structure can have exceptionally low thermal resistance with moderate thermal conductivity. In low and medium thickness applications this lower thermal resistance can greatly enhance heat transfer because thermal coupling is more efficient.

more info

Nordson EFD

Recommended Thermal Compound based on Bond Line



Non-Metal Filled Low TR Thermal Grease
TC: 1.3 W/mK
TR: 0.0310 °C/W

Metal Filled Low BLT Thermal Grease
TC: 2.0 W/mK
TR: 0.0416 °C/W

Non-Metal Filled WC Thermal Grease
TC: 1.3 W/mK
TR: 0.0334 °C/W

Non-Metal Filled High TC Thermal Grease
TC: 3.8 W/mK
TR: 0.0671 °C/W

Metal Filled High TC Thermal Grease
TC: 6.0 W/mK
TR: 0.0607 °C/W

Non-Metal Filled Original Thermal Grease
TC: 0.92 W/mK
TR: 0.0800 °C/W

Non-Metal Filled Low Cost Gap Filler
TC: 3.5 W/mK
TR: 0.100 °C/W

Metal filled Gap Filler
TC: 7.4 W/mK
TR: 0.085 °C/W

For Nordson EFD sales and service in over 40 countries, contact Nordson EFD or go to www.nordsonefd.com

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