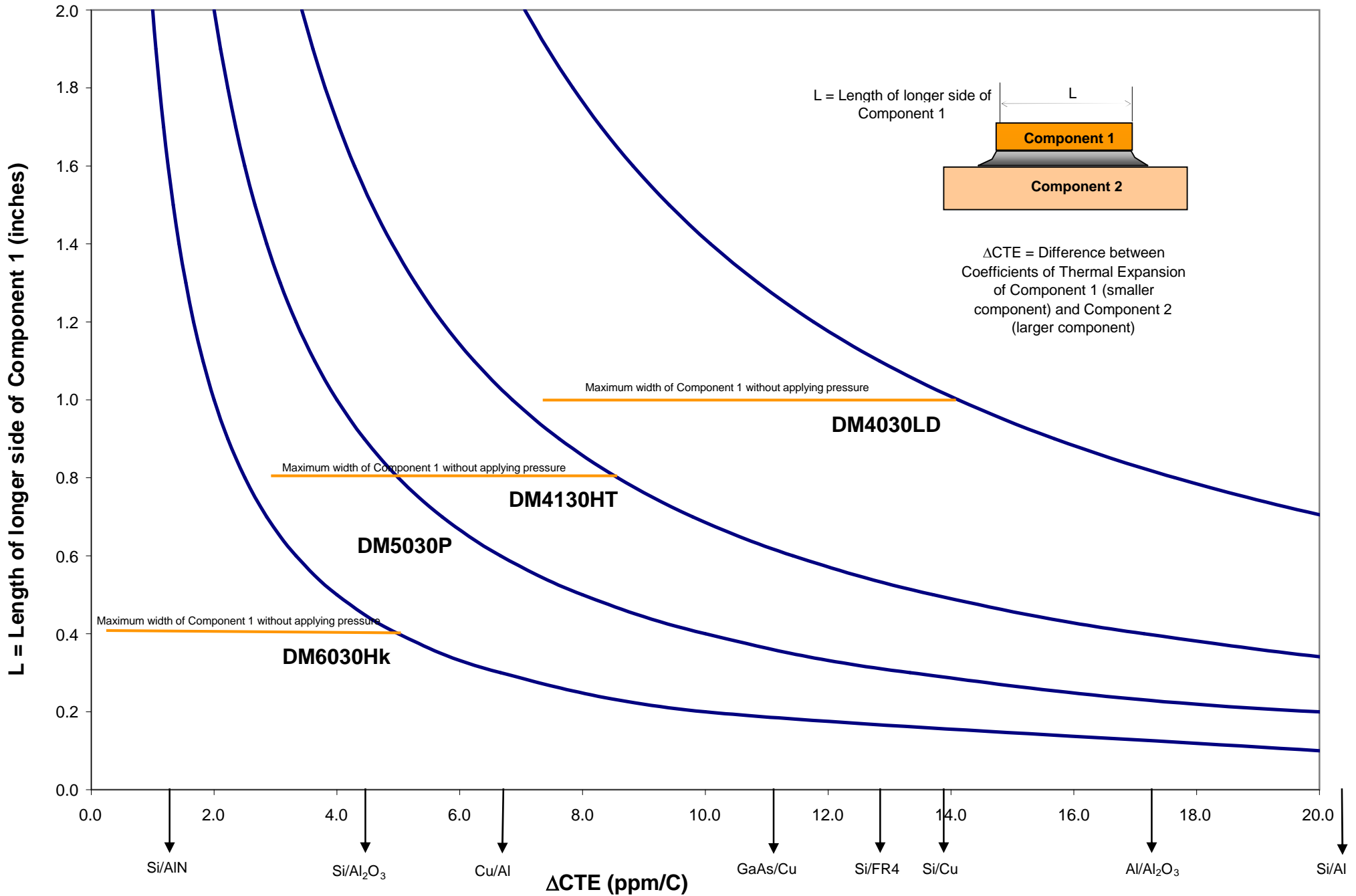




A **NAVIC** COMPANY

# APPLICATION SPECIFIC STRESS CHART





## How to use the Diemat size chart to select an adhesive

A key factor in selecting an adhesive is stress in the bondline, which can cause the bond to fail. This stress can arise during curing or device operation due to mismatch in coefficients of thermal expansion (CTEs) of the two materials being bonded.

The stress is proportional to the difference in CTEs and to the length of the smaller component being bonded. This component might be a semiconductor die being bonded to a substrate, or a heat spreader being bonded to a heat sink.

The size chart shows the safe operating areas for four popular Diemat adhesives. Each adhesive has a different value of modulus (rigidity). DM4030LD is the most compliant material on the chart and can handle larger components and CTE mismatches, while DM6030Hk is the least compliant.

To use the chart, determine the CTE of both materials being bonded, and calculate the difference in CTEs. (Note that the Resources section of [www.diemat.com](http://www.diemat.com) contains approximate CTEs for many semiconductor and packaging materials.) For example, take a silicon die on an alumina substrate. The CTEs of these materials are about 2.5 ppm/°C and 7 ppm/°C, respectively, so the difference is about 4.5 ppm/°C. Locate this value on the X (horizontal) axis of the chart.

Then determine the length of the longer side of the smaller component and locate this value on the Y (vertical) axis of the chart. Locate the point where the X and Y values meet. Any adhesive whose stress curve lies above this point is safe to use.

To continue the example, a silicon die 400 mils long can be bonded to alumina with any of the adhesives in the chart, but bonding a 750-mil long alumina substrate to an aluminum heat sink requires DM4030LD.

Another factor related to component size is solvent removal. The Diemat adhesives shown on this chart contain solvents which must be removed during the curing process. They use different solvent systems that vary in how quickly they leave the bondline as the adhesive cures. The faster-moving solvents can be used with larger component sizes.

Above a critical component size, pressure must be applied to hold the components together at the proper spacing. This pressure may be applied, for example, by a clip or weight. The horizontal orange lines in the chart show the maximum component width below which pressure is not needed. (Note that the length of the component is related to the stress, while the width determines the solvent removal capacity.)

For further applications information, please see [www.diemat.com](http://www.diemat.com) or contact Diemat at [info@diemat.com](mailto:info@diemat.com) or +1 978-499-0900.

Revised: 032008