

# 3M™ Thermally Conductive Adhesive Transfer Tapes

## 8805 • 8810 • 8815 • 8820

### Product Description

3M™ Thermally Conductive Adhesive Transfer Tapes 8805, 8810, 8815 and 8820 are designed to provide a preferential heat-transfer path between heat-generating components and heat sinks or other cooling devices (e.g., fans, heat spreaders or heat pipes).

### Features and Benefits

- High mechanical strength
- Improved surface wet-out for rough surface/LSE substrates
- Excellent shock performance
- Wider and longer roll is available
- Halogen free\*
- Ideal for thin bonding applications
- Good thermal transfer

### Product Construction

| 3M™ Thermally Conductive Adhesive Transfer Tapes |                                                                                                                                 |                   |                    |                   |
|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------------|-------------------|
| Product Number                                   | 8805                                                                                                                            | 8810              | 8815               | 8820              |
| Color                                            | White                                                                                                                           |                   |                    |                   |
| Tape Type                                        | Filled Acrylic Polymer                                                                                                          |                   |                    |                   |
| Tape Thickness                                   | 0.125 mm (5 mils)                                                                                                               | 0.25 mm (10 mils) | 0.375 mm (15 mils) | 0.50 mm (20 mils) |
| Filler Type                                      | Ceramic                                                                                                                         |                   |                    |                   |
| Liner Type                                       | Dual liner using silicone-treated polyester.<br>Easy release PET liner is clear in color, tight side PET liner is blue in color |                   |                    |                   |
| Liner Thickness                                  | 37.5-50 µm (1.5~2 mils) thickness for inside or outside wound liner.                                                            |                   |                    |                   |

\*Halogen Free is defined as having maximum 900 ppm bromine, maximum 900 ppm chlorine, and/or maximum 1500 ppm total bromine and chlorine, per IEC 61249-2-21.



## Typical Physical Properties and Performance Characteristics

**Note:** The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

| Product Number                                                                        | 3M™ Thermally Conductive Adhesive Transfer Tapes                                                                                                  |                        |                        |                          | Method                                            |
|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|------------------------|--------------------------|---------------------------------------------------|
|                                                                                       | 8805                                                                                                                                              | 8810                   | 8815                   | 8820                     |                                                   |
| Property                                                                              | Value                                                                                                                                             |                        |                        |                          | Method                                            |
| Thermal Impedance (°C cm²/W)<br>(°C in²/W)                                            | 3.2<br>(0.5)                                                                                                                                      | 5.8<br>(0.9)           | 7.7<br>(1.2)           | 9.7<br>(1.5)             | 3M test method                                    |
| Thermal Conductivity (W/m-K)                                                          | 0.60                                                                                                                                              |                        |                        |                          | ASTM C-177                                        |
| Specific Gravity                                                                      | 1.07 g/cc                                                                                                                                         |                        |                        |                          |                                                   |
| Surface Resistivity (Ω-cm)                                                            | 1.6 x 10 <sup>11</sup>                                                                                                                            | 1.6 x 10 <sup>11</sup> | 1.5 x 10 <sup>11</sup> | **1.5 x 10 <sup>11</sup> | ASTM D-2577                                       |
| Volume Resistivity (Ω-cm)                                                             | 5.2 x 10 <sup>11</sup>                                                                                                                            | 3.9 x 10 <sup>11</sup> | 3.8 x 10 <sup>11</sup> | **3.8 x 10 <sup>11</sup> | ASTM D-2577                                       |
| Dielectric Strength (kV/mm)<br>(V/mil)                                                | 26<br>(688)                                                                                                                                       |                        |                        | **<br>**                 | ASTM D-149                                        |
| Dielectric Properties (frequency)                                                     | 3 MHz                                                                                                                                             | 100 MHz                | 1 GHz                  | **                       | ASTM D-150                                        |
| Dielectric Constant (8815)                                                            | 93.5                                                                                                                                              | 3.2                    | 3.0                    | **                       | ASTM D-150                                        |
| 90 Degree Peel Test<br>grams/25.4 mm width<br>(oz/in)<br>Untreated aluminum substrate | 8805                                                                                                                                              | 8810                   | 8815                   | 8820                     | 3M test method<br>1 mil PET Backing               |
| Room Temp Dwell @ 15 min                                                              | 990 (35)                                                                                                                                          | 1300 (46)              | 1500 (53)              | 1700 (60)                |                                                   |
| 65°C Dwell @ 15 min                                                                   | 1450 (51)                                                                                                                                         | 2040 (72)              | 2440 (86)              | 2780 (98)                |                                                   |
| Room Temp Dwell @ 72 hrs                                                              | 1500 (53)                                                                                                                                         | 2130 (75)              | 2520 (89)              | 3060 (108)               |                                                   |
| 65°C Temp Dwell @ 72 hrs                                                              | 1590 (56)                                                                                                                                         | 2500 (88)              | 4000 (141)             | 4130 (181)               |                                                   |
| Static Shear test of holding<br>1000g @ Room Temp using 1 in²                         | PASS                                                                                                                                              | PASS                   | PASS                   | PASS                     | 3M test method:<br>SS & PET<br>Hold weight 1 week |
| Static Shear test of holding<br>500g @ 70°C using 1 in²                               | PASS                                                                                                                                              | PASS                   | PASS                   | PASS                     | 3M test method:<br>SS & PET<br>Hold weight 1 week |
| Heat Aging and Environmental<br>Cycling Performance                                   | Products pass UL-746C Heat Aging testing* and<br>Environmental Cycling testing. Contact your<br>3M technical services representative for details. |                        |                        | TBD                      | UL-746C                                           |

\*UL-746A file number E213134

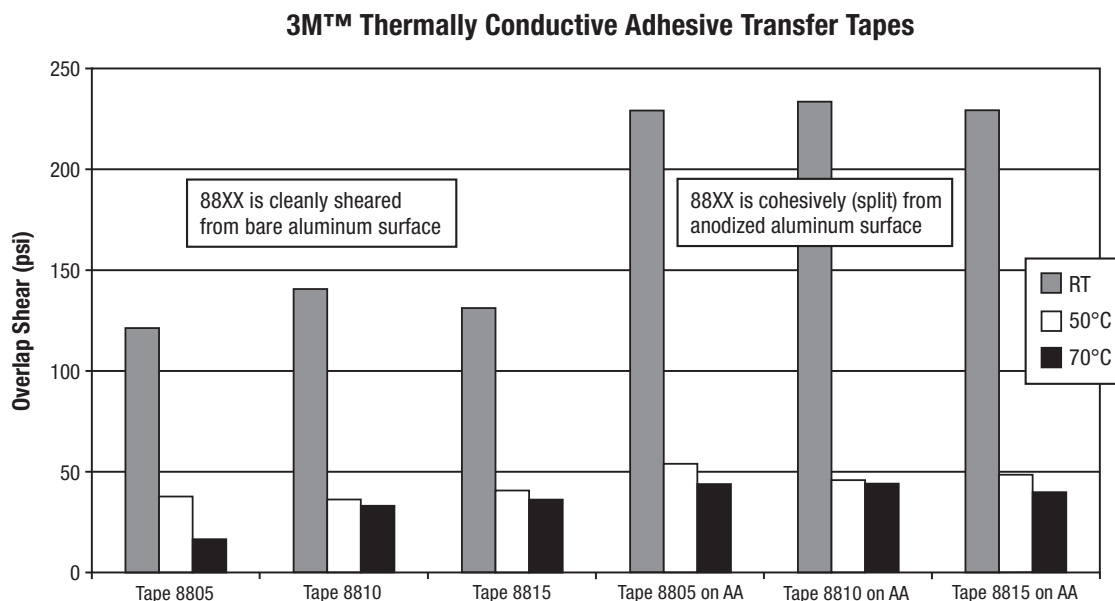
\*\*Estimated value based on Tape 8815 test data

\*\*\*When ASTM is mentioned, the test was performed in accordance with the ASTM test method

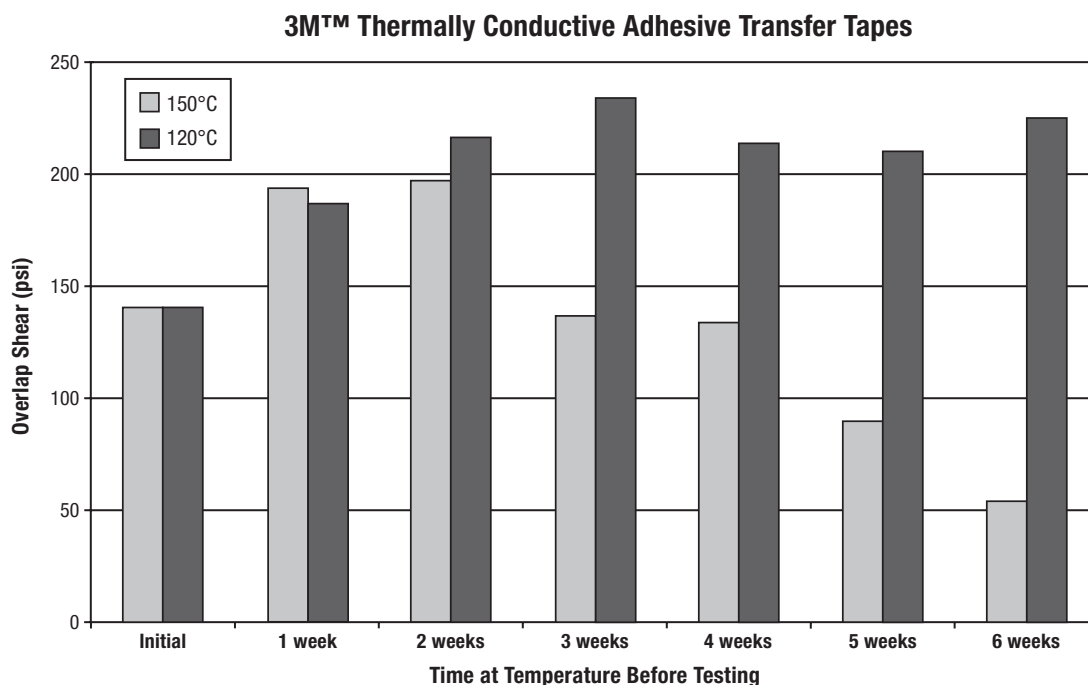
## Typical Physical Properties and Performance Characteristics (continued)

**Note:** The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

**Overlap Shear at Specific Temperatures Properties:** (Test conditions: Test substrates are bare untreated aluminum or anodized aluminum, 1 in.<sup>2</sup> test sample size, shear speed = 0.5 inch/minute. Samples heated to temperature noted below in 5 minutes and then OLS tested. Before testing, samples are dwelled for 3 days at RT to build adhesive bond to substrate).



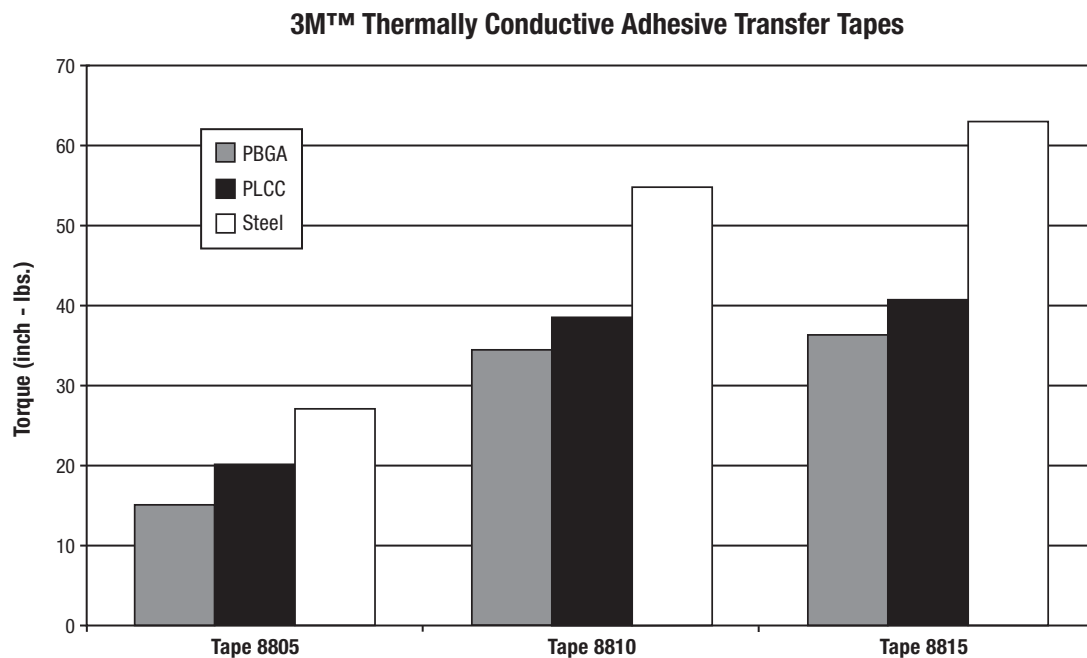
**Overlap Shear Heat Aged Properties:** (Test conditions: Test substrates are bare untreated aluminum, OLS speed is 0.5 in./min., adhesive cleanly removes from substrate surface during OLS test, 1 in.<sup>2</sup> test sample size, test at RT conditions after aging cycle complete, 3M Tape 8810).



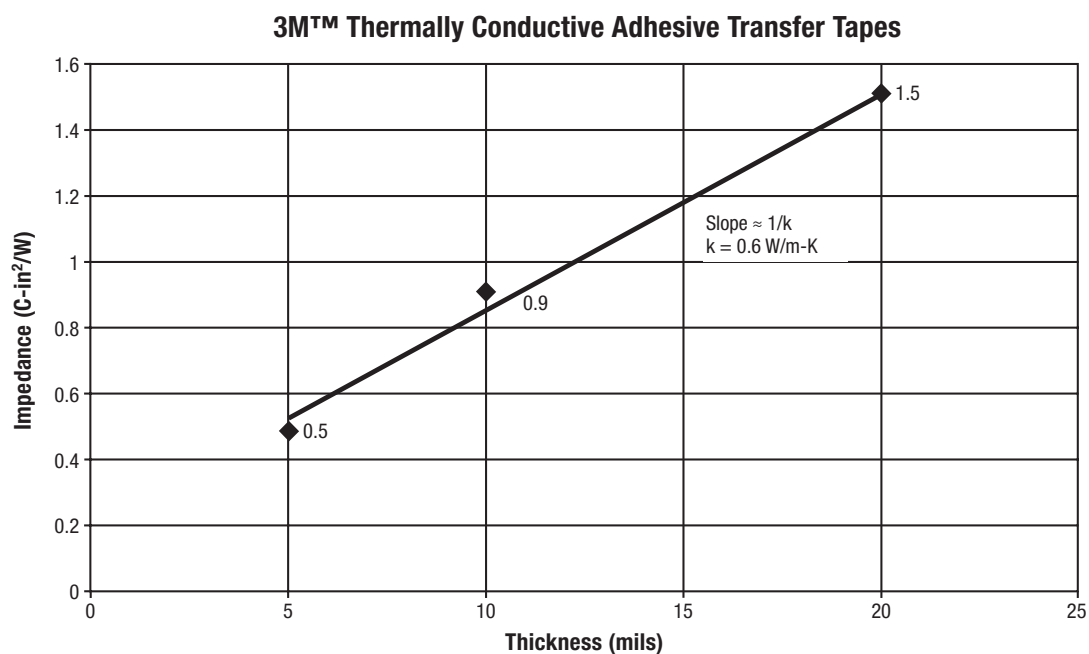
## Typical Physical Properties and Performance Characteristics (continued)

**Note:** The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

**Torque Resistance:** (Test conditions: This test indicates the resistance to twisting shear forces, heat sink attachment to different chip package material types, 1.0 hour room temperature dwell after attachment to the package surface before torque testing is completed).



**Thermal Impedance (C-in<sup>2</sup>/W) vs. Thickness:** (Test Conditions: 3M test method).



## Available Sizes

**Width:** Maximum width 22 inches.

**Length:** Multiples of 36 yds. Maximum 108 yds.

**Custom Sizes:** Contact your local 3M sales representative for information and availability of custom sizes (width and length) or die cut parts of 3M™ Thermally Conductive Adhesive Transfer Tapes 8805, 8810, 8815 and 8820.

## Application Guidelines

- 1) Substrate surfaces should be clean and dry prior to tape application. Isopropyl alcohol (isopropanol) applied with a lint-free wipe or swab should be adequate for removing surface contamination such as dust or finger prints. Do not use “denatured alcohol” or glass cleaners which often contain oily components. Allow the surface to dry for several minutes before applying the tape. More aggressive solvents (such as acetone, methyl ethyl ketone (MEK) or toluene) may be required to remove heavier contamination (grease, machine oils, solder flux, etc.) but should be followed by a final isopropanol wipe as described above.

**Note:**-Be sure to read and follow the manufacturers’ precautions and directions when using primers and solvents.

- 2) Apply the tape to one substrate at a modest angle with the use of a squeegee, rubber roller or finger pressure to help reduce the potential for air entrapment under the tape during its application. The liner can be removed after positioning the tape onto the first substrate.
- 3) Assemble the part by applying compression to the substrates to ensure a good wetting of the substrate surfaces with the tape. Proper application of pressure (amount of pressure, time applied, temperature applied) will depend upon design of the parts. Rigid substrates are more difficult to bond without air entrapment as most rigid parts are not flat. Use of a thicker tape may result in increased wetting of rigid substrates. Flexible substrates can be bonded to rigid or flexible parts with much less concern about air entrapment because one of the flexible substrates can conform to the other substrate.
- 4) Application pressure guideline table for 3M™ Thermally Conductive Adhesive Transfer Tapes 8805, 8810, 8815 and 8820.

| Substrate                   | Application Conditions                                                                                              | Time           |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------|----------------|
| <b>Rigid to rigid</b>       | Minimum: 15 psi at room temperature<br>Preferred: 50 psi at room temperature<br>More pressure equals better wetting | 2 sec<br>5 sec |
| <b>Flexible to rigid</b>    | Minimum: 5 psi at room temperature<br>Preferred: 15 psi at room temperature                                         | 1 sec<br>5 sec |
| <b>Flexible to flexible</b> | Minimum: 5 psi at room temperature<br>Preferred: 15 psi at room temperature                                         | 1 sec<br>5 sec |

## Application Guidelines (continued)

### 5) Application Tips:

- For rigid to rigid bonding, a twisting motion during assembly of the substrates will improve wetting. This should be a back and forth twisting motion during the application of compression.
- For flexible to rigid or flexible to flexible bonding, a roll lamination system may be employed to apply the flexible substrate down to the rigid (or other flexible) substrate. Rubber nip rollers, heated steel rollers, and other methods can be employed to bond in a continuous manner.
- Heat can be employed to increase wetting percentage and wetting rate of the substrates and to build room temperature bond strength.
- Primers may be employed to increase adhesion to low surface energy substrates (eg. plastic packages). Contact your 3M Technical Service Representative for more information about primers.
- For best product performance, it is important to use pressure and time conditions to achieve as much wetting as possible.

### 6) Rework Tips:

- Rework requires separation of the two substrates. Separation can be accomplished by any practical means: prying, torquing or peeling. The tape will be destroyed upon separation and must be replaced. The surfaces should be re-cleaned according to the recommendations in this data page.
- Heating up the substrates can reduce the adhesion level and make removal easier.
- Part separation can be aided by immersion in warm water. This should eventually reduce the adhesion and make prying, torquing or peeling apart the substrates easier.

## Application Ideas

- 3M™ Thermally Conductive Adhesive Transfer Tapes 8805, 8810, 8815 and 8820 are designed to provide a preferential heat-transfer path between heat-generating devices and cooling devices (e.g., fans, heat pipes and heat sinks).

## Shelf Life

The shelf life of 3M™ Thermally Conductive Adhesive Transfer Tapes 8805, 8810, 8815 and 8820 is 24 months from the date of manufacture when stored in the original packaging materials and stored at 22°C (72°F) and 50% relative humidity.

## Regulatory

For regulatory information about this product, contact your 3M representative.

## Technical Information

The technical information, recommendations and other statements contained in this document are based upon tests or experience that 3M believes are reliable, but the accuracy or completeness of such information is not guaranteed.

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