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).

- These tapes are tacky pressure sensitive adhesives loaded with thermally conductive ceramic fillers that do not require a heat cure cycle to form an excellent bond to many substrates. Only pressure is needed to form an excellent bond and thermal interface.
- The specialized chemistry of tapes 8805, 8810, 8815 and 8820 renders them modestly soft and able to wet to many surfaces, allowing them to conform well to non-flat substrates, provide high adhesion, and act as a good thermal interface.
- The specialized acrylic chemistry of tapes 8805, 8810, 8815 and 8820 provides for excellent thermal stability of the base polymer.
- The thermally conductive tapes are provided on a silicone treated polyester release liner for ease of handling and die cutting.
- The tapes offer excellent adhesive performance with good wetting and flow onto many substrate surfaces. These tapes offer both good thermal conductivity and good electrical insulation properties.

Product Construction

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

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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.

Product Number	3M™ Thermally Conductive Adhesive Transfer Tapes 8805	8810	8815	8820	
Property	**Value**				**Method**
Thermal Impedance (C-in.^{2}/W)	0.50	0.90	1.20	1.50	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^{11}	1.6 x 10^{11}	1.5 x 10^{11}	**1.5 x 10^{11}	ASTM D-257
Volume Resistivity (Ω-cm)	5.2 x 10^{11}	3.9 x 10^{11}	3.8 x 10^{11}	**3.8 x 10^{11}	ASTM D-2577
Dielectric Strength (Volts/mil)	668 Volts / mil (UL-746A*)			**	ASTM D-149
Dielectric Properties (frequency)	*3 MHz*	*100 MHz*	*1 GHz*	**	ASTM D-150
Dielectric Constant (8815)	3.5	3.2	3.0	**	ASTM D-150
90 Degree Peel Test (oz/in) Untreated aluminum substrate	**8805**	**8810**	**8815**	**8820**	3M test method 1 mil PET Backing
Room Temp Dwell @ 15 min	35	46	53	60	
65°C Dwell @ 15 min	51	72	86	98	
Room Temp Dwell @ 72 hrs	53	75	89	108	
65°C Temp Dwell @ 72 hrs	56	88	141	181	
Static Shear test of holding 1000g @ Room Temp using 1 in^2	PASS	PASS	PASS	PASS	3M test method: SS & PET Hold weight 1 week
Static Shear test of holding 500g @ 70°C using 1 in^2	PASS	PASS	PASS	PASS	3M test method: SS & PET Hold weight 1 week
Heat Aging and Environmental Cycling Performance	Products pass UL-746C Heat Aging testing and Environmental Cycling testing. See pg. 8 for details.			TBD	UL-746C

*UL-746A file number E213134 **Estimated value based on Tape 8815 test data

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.^{2} 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).

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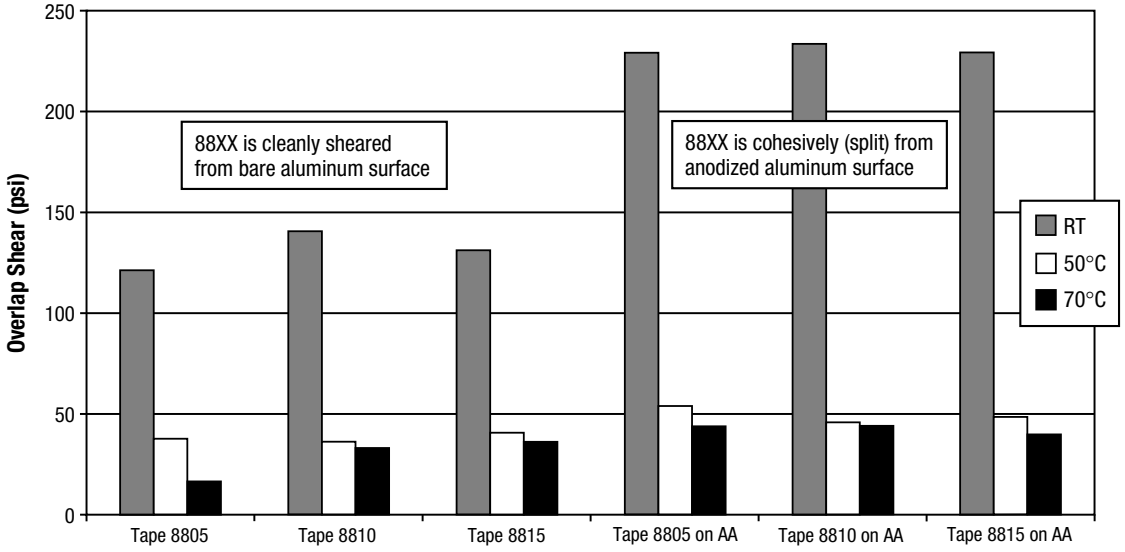
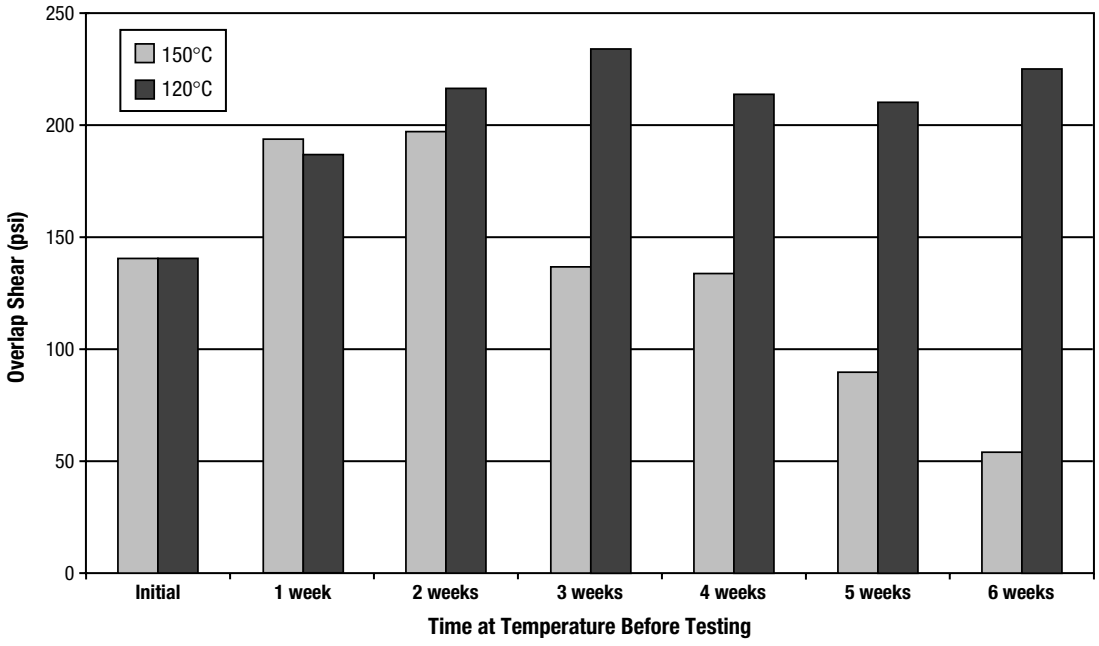


Overlap Shear Heat Aged Properties: (Test conditions: Test substrates are bare untreated aluminum, OLS speed is 0.5 in./min., adhesive cleanly removes from substrate surface during OLS test, 1 in.^{2} test sample size, test at RT conditions after aging cycle complete, 3M Tape 8810).

3M™ Thermally Conductive Adhesive Transfer Tapes



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).

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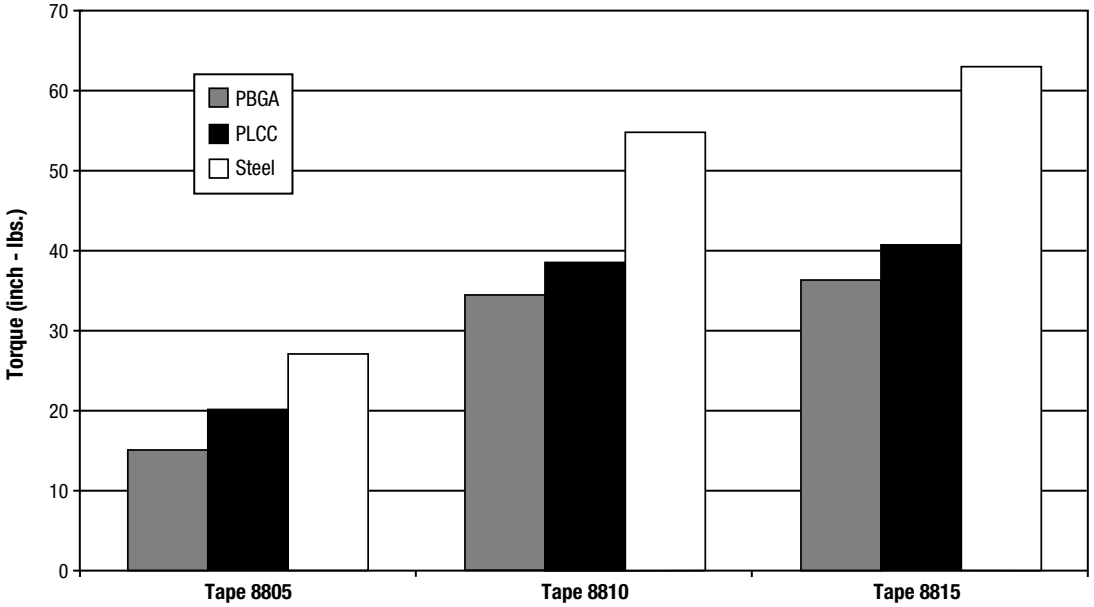
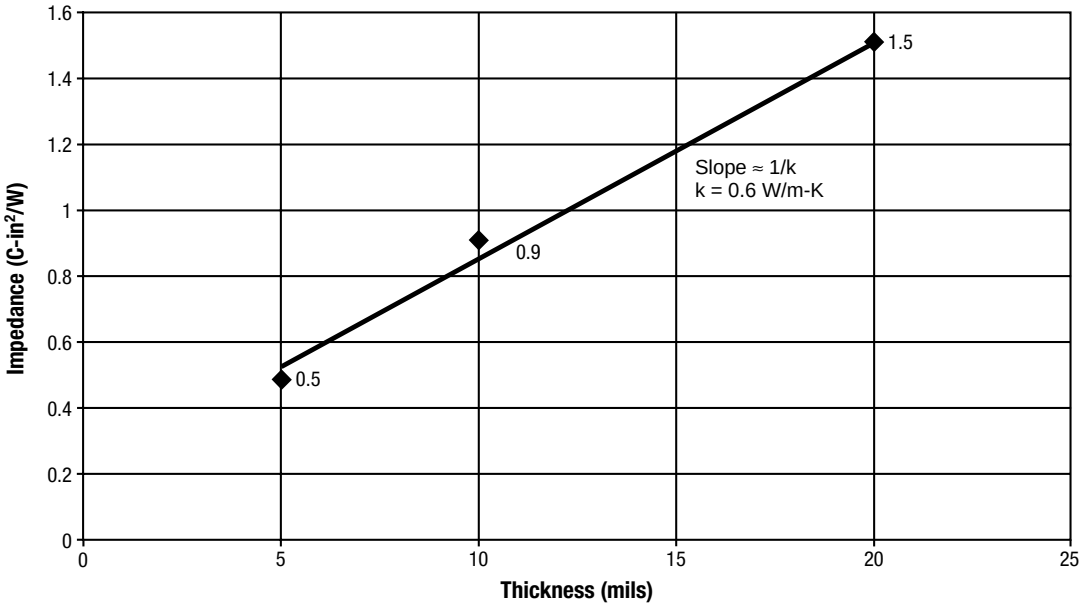


Thermal Impedance (C-in²/W) vs. Thickness: (Test Conditions: 3M test method).

3M™ Thermally Conductive Adhesive Transfer Tapes



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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
Rigid to rigid	Minimum: 15 psi at room temperature Preferred: 50 psi at room temperature More pressure equals better wetting	2 sec 5 sec
Flexible to rigid	Minimum: 5 psi at room temperature Preferred: 15 psi at room temperature	1 sec 5 sec
Flexible to flexible	Minimum: 5 psi at room temperature Preferred: 15 psi at room temperature	1 sec 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.

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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).

General Information

Product selection table for 3M™ Thermally Conductive Materials.

Product	Thickness (mm)	Bulk Thermal Conductivity (W/m-K)	Typical Applications
3M™ Thermally Conductive Tapes			
9889FR	1.0	0.5	Applications requiring gap filling and bonding with good thermal transfer; plasma display, IC packages and PCB bonding to heat sinks, metal cases and other cooling devices.
3M™ Thermally Conductive Pads			
5516/5516S	0.5, 1.0, 1.5, 2.0	2.3	Applications requiring gap filling and superior thermal performance without bonding. IC package and PCB thermal interfacing with heat sinks or other cooling devices and metal cases.
5519/5519S	0.5, 1.0, 1.5, 2.0	4.3	
5591S	0.5, 1.0, 1.5, 2.0	1.0	
5592/5592S	0.5, 1.0, 1.5, 2.0	1.1	
5595/5595S	0.5, 1.0, 1.5, 2.0	1.6	
3M™ Thermally Conductive Pads (Acrylic)			
5598H	1.0, 1.5	2.0	These pads use an acrylic elastomer for applications that require a non-silicone thermal pad. Provides IC package and PCB thermal interfacing with heat sinks or other cooling devices, and metal cases.
5590H	0.5, 1.0, 1.5	3.0	
3M™ Thermally Conductive Epoxy Adhesives			
TC-2707	—	0.7	Applications requiring high adhesive strength, good surface wet-out, gap filling and good thermal transfer. Provides IC package and PCB thermal interfacing with heat sinks or other cooling devices.
TC-2810	—	1.0	
DP-190 Gray	—	0.4	

Only the “S” versions are available in 0.5 mm thicknesses.
“S” designation signifies a polyester film on one side to provide a non-tacky surface.
“H” designation signifies a product with one one-tacky surface without the use of PET film.

Shelf Life

Product shelf life is 2 years from date of manufacture when stored at room temperature conditions (72°F [22°C] and 50% RH) in the products original packaging.

For Additional Information

To request additional product information or to arrange for sales assistance, call toll free 1-800-251-8634. Address correspondence to: 3M Electronics Markets Materials Division, Building 21-1W-10, 900 Bush Avenue, St. Paul, MN 55144-1000. Our fax number is 651-778-4244 or 1-877-369-2923. In Canada, phone: 1-800-364-3577. In Puerto Rico, phone: 1-787-750-3000. In Mexico, phone: 52-70-04-00.

Certification/Recognition

MSDS: 3M has not prepared a MSDS for these products which are not subject to the MSDS requirements of the Occupational Safety and Health Administration's Hazard Communication Standard, 29 C.F.R. 1910.1200(b)(6)(v). When used under reasonable conditions or in accordance with the 3M directions
for use, these products should not present a health and safety hazard. However, use or processing of the product in a manner not in accordance with the directions for use may affect their performance and present potential health and safety hazards.

TSCA: These products are defined as articles under the Toxic Substances Control Act and therefore, are exempt from inventory listing requirements.

UL: 3M™ Thermally Conductive Adhesive Transfer Tapes 8805, 8810 and 8815 have been recognized by Underwriters Laboratories Inc. per UL-746C and UL-746A.

Per UL-746C testing, the maximum temperature rating for the 8805, 8810 or 8815 is 100°C when tested on glass epoxy or an anodized aluminum substrate. The products meet the UL-746C test requirement of maintaining at least 50% of their initially tested Overlap Shear strength after heat aging for 1000 hours at 150°C. (See UL file #MH17478 for details):

Additional testing completed and passed per UL-746C test methods include:

– Effect of Humidity: 7 days @ 95% Relative Humidity (RH) @ 60°C.
– Effect of Environmental Cycling (3 cycles): 1 cycle = 24h immersed in 25°C water / 24h @ 100°C / 96h @ 35°C @ 90% RH / 8 h @ -35°C.

Note: 3M™ Thermally Conductive Adhesive Transfer Tape 8820 has not been tested per UL-746C or UL-746A test procedures.

Important Notice

All statements, technical information, and recommendations related to 3M's products are based on information believed to be reliable, but the accuracy or completeness is not guaranteed. Before using this product, you must evaluate it and determine if it is suitable for your intended application. You assume all risks and liability associated with such use. Any statements related to the product which are not contained in 3M's current publications, or any contrary statements contained on your purchase order shall have no force or effect unless expressly agreed upon, in writing, by an authorized officer of 3M.

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