



3M Company, operating in more than 60 countries, has over 60,000 products. These products, based on 40 technology platforms, have been developed by 6,500 3M Product Developers Worldwide.

# Business

# Mission

3M Electronics is dedicated to continue building on our technologies and our expertise, and being your first choice for next-generation design, process, and materials solutions.



Attaching

Bonding

Sealing

Packaging

Shipping

Identifying

Securing

Protecting

Lapping

Polishing

Conducting

Damping

Shielding

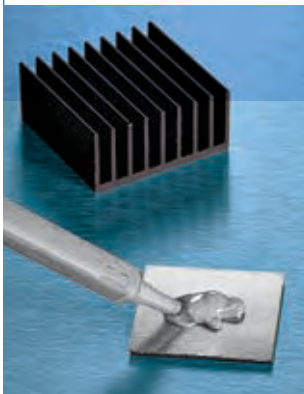
Cleaning

3M Electronics offers a broad range of specialized solutions for today's demanding electronics assembly applications. From adhesives, tapes, abrasives and coatings to technologies designed to detect tampering and water intrusion, 3M offers you more ways to speed assembly... add functionality... and improve the reliability of your products.

As a 3M customer, you're backed by a global network of sales, manufacturing and technical resources – dedicated to helping you apply 3M technologies to their full advantage.

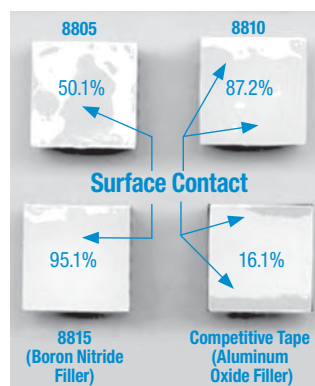
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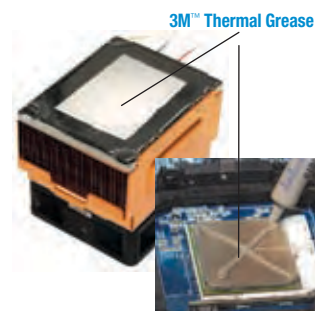


### 3M™ Thermally Conductive Adhesive Transfer Tape % Wet-Out of Heat Sink to Glass Slide



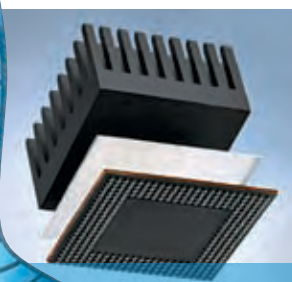
Dark areas show adhesive wet-out.

Increased wet-out improves both mechanical and thermal performance. Relative darker color indicates surface contact has occurred. Boron nitride filler appears lighter in color versus aluminum oxide filler.



### 3M™ Thermally Conductive Adhesive Transfer Tapes 8805, 8810, 8815, 8820

High temperature adhesion with good dielectric strength. Applies quickly and easily using die-cut shapes.



#### Heat Sink

3M™ Thermally Conductive Adhesive Transfer Tape bonds a heat sink to a component and provides a thermal path for component cooling.

## Specialty Products for Thermal Management Applications

### 3M™ Thermally Conductive Interface Pads: Silicone or Acrylic Elastomers

3M™ Hyper-Soft Thermally Conductive Interface Pads are used to transfer heat from a hot surface or device to a cooler surface region of the assembled design. The 3M Thermally Conductive pads are available in a silicone elastomer version or an acrylic elastomer version where a non-silicone base material is desired. The pads are designed in a variety of thermal conductivities and softness grades to provide excellent gap filling, low assembled stress and a high degree of wet-out for more efficient heat transfer.

### 3M™ Thermally Conductive Epoxies

This range of liquid adhesives has minimal odor and superior structural adhesion strength. Dispensing is easy for high output, in-line automated manufacturing and manual application. Adhesive flows and fills micro-spaces on surfaces. Ultra-thin bond line helps achieve low thermal impedance.

### 3M™ Thermally Conductive Adhesive Transfer Tapes

This range of high adhesion thin tapes offers efficient thermal transfer for a wide range of applications requiring a thermal management solution: bonding heat sinks, heat spreaders and other cooling devices to IC packages, power transistors, and other heat generating components.

Each tape combines 3M high performance acrylic adhesive with highly conductive ceramic particles for an extremely reliable and user-friendly thermal interface. Highly conformable construction provides excellent wet-out on surfaces.

### 3M™ Thermally Conductive Grease

The 3M™ Thermally Conductive Greases are high performance thermal interface materials for transferring thermal energy from a heat source (e.g. processor chip, graphics chip, High Power LED) to a heat sink. The proprietary blend of inorganic fillers contained in an organic matrix (non-silicone) ensures high thermal conductivity and low thermal resistance. Grease products are available in two versions: Standard viscosity and a lower viscosity version that can be useful in screen printing application methods.

### 3M™ Thermally Conductive Interface Materials Typical Applications

Product	Typical Applications
8805, 8810 8815, 8820	Thermally conductive adhesive transfer tapes with high mechanical strength, improved surface wet-out, and excellent shock performance. Applications include: heat sink attachment, flex circuit bonding, power device attachment and general thermal attachment solutions.
9882, 9885, 9890	3M's original thermally conductive adhesive transfer tape for applications requiring thin bonding with good thermal transfer.
TM-670SA, TM-671SA, TM-672SA	Thermally conductive adhesive transfer tapes with different adhesion performance for the liner side and non-liner side. Flame retardant performance.
9889FR	One millimeter thick, flame retardant acrylic soft tape for applications requiring gap filling and bonding with good thermal transfer, generally used for large surface area bonding.
5516/5516S <sup>2</sup> , 5519, 5519S <sup>2</sup> 5591S <sup>2</sup> , 5592 <sup>1</sup> 5595 <sup>1</sup>	Thermally conductive interface pads (silicone) for applications requiring gap filling and superior thermal performance without bonding. Provides IC package and PCB thermal interfacing with heat sinks or other cooling device, and metal cases.
TC-2707, TC-2810 DP 190 Gray	Thermally conductive epoxies for applications requiring high adhesive strength, good surface wet-out, gap filling or thin bond lines with good thermal transfer.
5589H <sup>2</sup> 5590H <sup>2</sup>	Thermally conductive interface pads use an acrylic elastomer for applications that require a non-silicone thermal pad.
TCG-2035/TCG-2031* TCG-2037/TCG-2033*	Thermally conductive greases provide a thin thermal interface to optimize thermal heat transfer between hot running devices and heat sinking surfaces. Excellent flow properties for improved interface wet-out.

\* Note 1) 3M Greases TCG-2031 and TCG-2033 are supplied with a small wt% of a solvent added to lower viscosity. Lower viscosity can allow for reduced thickness during application and may benefit screen printing options. Effective thermal measurements are not significantly different from non-solvent added versions. Shear Rate viscosity reduced by 5-10x.

<sup>1</sup> 3M Pads 5591, 5592 and 5595 are also available with a polyester film on one side to provide a non-tacky surface.

<sup>2</sup> "S" designation signifies a polyester (PET) or a PEN film on one side to provide a non-tacky surface. "H" designation signifies a product with one non-tacky surface without the use of a PET film.



#### Power Transistor Attachment

3M™ Thermally Conductive Adhesive Transfer Tape 8810 replaces silicone grease and screws for attaching transistors to heat sink.

## 3M™ Thermally Conductive Adhesive Transfer Tape Selection Guide

Product	Description				Adhesion Peel Strength @ 72 hr. Dwell at RT (N/cm)	Thermal Performance		Dielectric Properties		UL Flammability Rating	Potential Operating Temperature Range** (°C)
	Base Material Type	Product Thick- ness mil (mm)	Filler Type	Liner Type		Conductivity (W/m-K 3M ASTM D5470 TM)	Impedance °C-in <sup>2</sup> /W (°C-cm <sup>2</sup> /W)	Dielectric Strength (KV/mm)	Volume Resistivity (ohm/cm)		

### 3M™ High Adhesion Thermally Conductive Adhesive Transfer Tape (TCATT): Softer-Improved Surface Conformability Acrylic Thermal Tape

8805	Filled Acrylic Polymer	5 (0.13)	Ceramic	Silicone- Release Polyester: Dual Liners	5.8	0.6	0.48 (3.1)	26 8815 tested	5.2 X 10 <sup>11</sup>	UL Testing Note: Adhesive tapes are not intended to be used independently as a single component. Tapes are recognized for use with specific substrates and the tape/substrate is tested for a UL rating.	Short Term (Hours-Days): 125-150°C  Long Term (Weeks-Months): 90-100°C
8810		10 (0.25)			8.3		0.88 (5.7)		3.9 X 10 <sup>11</sup>		
8815		15 (0.38)			9.8		1.17 (7.6)		3.8 X 10 <sup>11</sup>		
8820		20 (0.51)			11.9		1.50 (9.7)		3.8 X 10 <sup>11</sup>		

### 3M™ Thermally Conductive Adhesive Transfer Tape (TCATT): Standard Acrylic Thermal Tape

9882	Filled Acrylic Polymer	2 (0.05)	Ceramic	Silicone Release Polyester	2.1 - 3.4	0.6	0.32 (2.1)	29 9890 tested	2 X 10 <sup>14</sup>	UL Testing Note: Adhesive tapes are not intended to be used independently as a single component. Tapes are recognized for use with specific substrates and the tape/substrate is tested for a UL rating.	Short Term (Hours-Days): 125-150°C  Long Term (Weeks-Months): 90-100°C
9885		5 (0.13)					0.49 (3.2)				
9890		10 (0.25)					0.89 (5.7)				

### 3M™ Thermally Conductive Adhesive Transfer Tape (TCATT): Flame retardant Acrylic Thermal Tapes

TM-670SA	Filled Acrylic Polymer	10 (0.25)	Ceramic	Silicone Release Paper Liner	27.0/7.2***	0.6	1.1 (7.1)	—	—	UL 94 V-2	Short Term (Hours-Days): 125-150°C  Long Term (Weeks-Months): 90-100°C
TM-671SA		15 (0.375)			27.3/9.3***		1.2 (7.8)				
TM-672SA		20 (0.5)			30.8/11.6***		1.4 (9.1)				

### 3M™ Thermally Conductive Acrylic Soft Tape (TCAST): Thick Acrylic Thermal Tape

9889FR*	Filled Acrylic Polymer	40 (1.0)	Ceramic	Silicone Release Paper	3.7 on Al Substrate	0.5	2.4 (15.6)	—	—	UL 94 V-2	Short Term (Hours-Days): 90-125°C  Long Term (Weeks-Months): 70-80°C
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Note: \*1) 3M Tape 9889FR is a specialty tape used for very large panels or surfaces where a very conformable thermal tape is needed to achieve good wet-out/adhesion. The 3M Tape 8820 is the suggested standard TCATT Thermal tape for most typical, somewhat larger surface areas as the thermal impedance is lower vs the 3M Tape 9889FR.

\*\* End use application testing will determine final temperature range based on final design and other environmental conditions. Suggested Temperature range is based on a UL-746 Test Method or a 3M Test Method.

\*\*\* TM-67X tapes are designed with a high/low adhesion construction. Face side or non-liner side when product roll is unwound is the lower adhesion side.

## 3M™ Thermally Conductive Epoxies Selection Guide

Product	Description				Thermal Performance		Dielectric Properties		Comments	Potential Operating Temperature Range** (°C)
	Base Material Type	Product Thickness mil (mm)	Filler Type	Packaging	Conductivity (W/m-K 3M ASTM D5470 TM)	Impedance °C-in <sup>2</sup> /W (°C-cm <sup>2</sup> /W) 2.0mil (50µm) bondline thickness	Dielectric Strength (KV/mm)	Volume Resistivity (ohm/cm)		

### 3M™ Thermally Conductive Epoxies

DP-190 Gray	Filled Epoxy	Various	Aluminum Silicate/ Carbon Black	2-part Epoxy/3M Duo-Pak.	0.38	0.32 (2.1) estimate	32.7	5.0 x 10 <sup>12</sup>	—	Short Term (Hours-Days): 125-140°C
TC-2707			Aluminum Metal		0.72	0.105 (0.67)	2.1	2.4 x 10 <sup>11</sup>	See note 2	Long Term (Weeks-Months): 80-100°C
TC-2810			Ceramic*		1.0-1.4*	0.05 (0.32)	3	7.6 x 10 <sup>11</sup>	See note 1	

\* Notes: 1) Thermal Conductivity (TC) can vary in an application as the filler is a Boron Nitride (BN) platelet shape and alignment of fillers can change effective TC.

2) As the 3M™ Thermally Conductive Epoxy Adhesive TC-2707 uses aluminum metal fillers, under certain end use application conditions, the effective resistivity and/or effective dielectric strength could be significantly lower than noted. If the metal fillers are "trapped" or "pinched" between two surfaces, an electrical bridge path via the aluminum fillers could occur between these surfaces. Epoxy Adhesive TC-2707 is not suggested for applications where a powered electrical circuit is used or where a reliable volume resistivity and/or dielectric strength is desired. 3M Thermally Conductive Epoxy Adhesives TC-2810 uses ceramic filler and is suggested product to test for these types of application performance needs.

\*\* End use application testing will determine final temperature range based on final design and other environmental conditions. Suggested Temperature range is based on a UL-746 Test Method or a 3M Test Method.

## 3M™ Thermally Conductive Interface Pads Selection Guide

Product	Description				Adhesion/Shore 00 Softness	Thermal Performance		Dielectric Properties		UL Flammability Rating	Potential Operating Temperature Range*** (°C)
	Base Material Type	Product Thickness mil (mm)	Filler Type	Liner Type	Adhesion Characterization /// Shore 00 Testing based on TM 6mm Thickness	Conductivity (W/m-K 3M ASTM D5470 TM)	Impedance**** °C-in²/W (°C-cm²/W)	Dielectric Strength KV/mm (Film version tested)	Volume Resistivity (ohm/cm)		
3M™ Thermally Conductive Interface Pads											
5516 5516S* Soft Pad	Filled Silicone Polymer	20(0.5) 40(1.0) 60(1.5) 80(2.0)	Ceramic	PET	No added adhesive layer. Pad is tacky and conformable /// Shore 00=73	3.1	0.31 (2.0) 0.53 (3.4) 0.76 (4.9) 0.98 (6.3)	3.1	6.9 x10 <sup>14</sup>	3M V1 or V0 TM**	Short Term (Hours-Days): 150°C Long Term (Weeks-Months): 100-125°C
Notes: *1) 3M Pad 5516S is Thermal Pad 5516 with a polymeric permanent film on one side to be used as a non-tacky surface for ease of reworking an assembly. Thermal Conductivity and Thermal Impedance are slightly changed with addition of the film, while Dielectric strength is improved.										2) Optional thicknesses >2.0mm are available. Call 3M for details.	
5519 5519S* Soft Pad	Filled Silicone Polymer	20 (0.5) 40 (1.0) 60 (1.5) 80 (2.0)	Ceramic	PET	No added adhesive layer. Pad is tacky and conformable /// Shore 00=80	4.1	0.29 (1.9) 0.48 (3.1) 0.65 (4.2) 0.82 (5.3)	3.1	6.9 x10 <sup>14</sup>	3M V1/V0 or V0 TM**	Short Term (Hours-Days): 150°C Long Term (Weeks-Months): 100-125°C
Notes: *1) 3M Pad 5519S is Thermal Pad 5519 with a polymeric permanent film on one side to be used as a non-tacky surface for ease of reworking an assembly. Thermal Conductivity and Thermal Impedance are slightly changed with addition of the film, while Dielectric strength is improved.										2) Optional thicknesses >2.0mm are available. Call 3M for details.	
5591, 5591S* Ultra Soft Pad	Filled Silicone Polymer	20 (0.5) 40 (1.0) 60 (1.5) 80 (2.0)	Ceramic	PET	No Added adhesive layer. Pad is tacky and conformable /// Shore 00=10-15	1.0	1.14 (7.3) 1.92 (12.4) 2.71 (17.5) 3.49 (22.5)	7.9	2.0 X 10 <sup>12</sup>	3M V1 or V0 TM**	Short Term (Hours-Days): 150°C Long Term (Weeks-Months): 100-125°C
Notes: *1) 3M Pad 5591S has a 12µm PET permanent film on one side to be used as a non-tacky surface for ease of reworking an assembly.						2) 3M Pad 5591S is available in the 0.5mm -2.0mm thickness.			3) Optional thicknesses > 2.0mm are available. Call 3M for details.		
5592 5592S* Soft Pad	Filled Silicone Polymer	20 (0.5) 40 (1.0) 60 (1.5) 80 (2.0)	Ceramic	PET	No added adhesive layer. Pad is tacky and conformable /// Shore 00=40-50	1.1	0.64 (4.1) 1.15 (7.4) 1.66 (10.7) 2.43 (15.7)	14.7	3.0 X 10 <sup>12</sup>	3M V1 or V0 TM**	Short Term (Hours-Days): 150°C Long Term (Weeks-Months): 100-125°C
Notes: *1) 3M Pad 5592S is Thermal Pad 5592 with a 12µm PET permanent film on one side to be used as a non-tacky surface for ease of reworking an assembly. Thermal Conductivity and Thermal Impedance are slightly changed with addition of the PET film, while Dielectric strength is improved.								2) 3M Pad 5592S is available in the 0.5mm -2.0mm thickness. 3M Pad 5592 1.0-2.0mm thickness.		3) Optional thicknesses > 2.0mm are available. Call 3M for details.	
5595 5595S* Soft Pad	Filled Silicone Polymer	20 (0.5) 40 (1.0) 60 (1.5) 80 (2.0)	Ceramic	PET	No added adhesive layer. Pad is tacky and conformable /// Shore 00=50-60	1.6	0.70 (4.5) 1.21 (7.8) 1.71 (11.0) 2.22 (14.3)	15.7	5.0 X 10 <sup>12</sup>	3M V1 or V0 TM**	Short Term (Hours-Days): 150°C Long Term (Weeks-Months): 100-125°C
Notes: *1) 3M Pad 5595S is Thermal Pad 5595 with a 12µm PET permanent film on one side to be used as a non-tacky surface for ease of reworking an assembly. Thermal Conductivity and Thermal Impedance are slightly changed with addition of the PET film, while Dielectric strength is improved.								2) 3M Pad 5595S is available in the 0.5mm -2.0mm thickness. 3M Pad 5595 1.0-2.0mm thickness.		3) Optional thicknesses > 2.0mm are available. Call 3M for details.	
** 3M V1 or V0 TM Notes: 1) Test results based on 3M UL Test Method. 2) The 3M V1 TM testing applies to the 0.5mm thick products in the “S” version.											
**** Thermal impedance is measured with the test sample under a nominal 10psi pressure to reflect a typical end use application.											

### 3M™ Thermally Conductive Interface Pads (Acrylic Elastomer)

5589H* Soft Pad	Filled Acrylic Polymer	40(1.0) 60(1.5)	Ceramic	PET	No added adhesive layer. Pad is tacky and conformable /// Asker C=16	2.0	1.33 (8.6) 1.67 (10.8)	21	3.4 X 10 <sup>12</sup>	UL V0	Short Term (Hours-Days): 110°C Long Term (Weeks-Months): 80°C
Note: *1) 3M Pad 5589H has a very low tack surface and a medium tack surface.											
5590H* Soft Pad	Filled Acrylic Polymer	20(0.5) 40(1.0) 60(1.5)	Ceramic	PET	No added adhesive layer. Pad is tacky and conformable /// Asker C=30	3.0	0.46 (3.0) 0.70 (4.5) 0.95 (6.1)	33	2.7 X 10 <sup>12</sup>	UL V0	Short Term (Hours-Days): 110°C Long Term (Weeks-Months): 80°C
Note: *1) 3M Pad 5590H has a very low tack surface and a medium tack surface.											
***End use application testing will determine final temperature range based on final design and other environmental conditions. Suggested Temperature range is based on a UL-746 Test Method or a 3M Test Method.											

## 3M™ Thermally Conductive Grease Selection Guide

Product	Description				Thermal Performance		Dielectric Properties		Comments	Potential Operating Temperature Range** (°C)
	Base Material Type	Product Thickness mil (mm)	Filler Type	Steady State Shear Viscosity @ 1.0 Shear/Rate	Conductivity (W/m-K 3M ASTM D5470 TM)	Impedance °C-in²/W (°C-cm²/W) @ Bond Line thickness of <2mil (0.05mm)	Dielectric Strength (KV/mm)	Volume Resistivity (ohm/cm)		
3M™ Thermally Conductive Grease										
TCG-2035/ TCG-2031*	Non-Silicone Polymeric Binder	Various	Ceramic	2100/150*	4.1	0.0127 (0.081)	4.7	1.36 x10 <sup>9</sup>	See note 1	Short Term (Hours-Days): 125-150°C
TCG-2037/ TCG-2033*			Ceramic & Metallic	340/36*	3.0	0.0170 (0.109)	0.1	4.1 x10 <sup>7</sup>	See note 1	Long Term (Weeks-Months): 100-125°C
* Note 1) 3M Greases TCG-2031 and TCG-2033 are supplied with a small wt% of a solvent added to lower viscosity. Lower viscosity can allow for reduced thickness during application and may benefit screen printing options. Effective thermal measurements are not significantly different from non-solvent added versions. Shear Rate viscosity reduced by 5-10x.										
** End use application testing will determine final temperature range based on final design and other environmental conditions. Suggested Temperature range is based on a UL-746 Test Method or a 3M Test Method.										

# 3M™ Electromagnetic Compatible Products ACF Interconnect Solutions

## 3M™ Anisotropic Conductive Film (ACF) Adhesives

Heat-bondable, Z-Axis conductive films, consisting of thermoplastic and thermoset adhesives randomly loaded with conductive particles. These particles allow interconnection of circuit lines through the adhesive thickness (the Z-Axis), but are spaced far enough apart for the product to be electrically insulating along the plane of the adhesive.

Product	Adhesive Thickness (μ)	Particle Type	Minimum Pitch (μ)	Bonding Conditions °F (°C)	Applications/Notes
5363	40	Gold-Plated Nickel	200	356 – 392 (180 – 200), 10-15 secs	For connecting copper on polyimide flex to PCB and flex-to-flex. Excellent high temperature reliability. Fast bond time.
5552R	19	Gold-Plated Nickel w/ Polymer Core	<100	338 – 374 (170 – 190), 20-30 secs	For connecting copper on polyimide flex-to-glass.
7303	74	Silver-Coated Glass	500	275 – 302 (135 – 150), 20-30 secs	For connecting silver ink on polyester or copper on polyimide flex-to-PCB and flex-to-flex. Excellent resistance to low temps and solvents.
7313	63	Silver-Coated Glass	500	275 – 302 (135 – 150), 5-10 secs	For connecting silver ink on polyester or copper on polyimide flex-to-PCB and flex-to-flex. Bonds at low temperatures; compatible with automated processes. Stored at room temperature.
7371	25	Gold-Plated Nickel w/ Polymer Core	<500	302 – 338 (140 – 170), 10-16 secs	For connecting flex circuits to polyester-based devices (plastic touch screen, plastic LCD, etc.).
7378	40	Gold-Nickel	200	160-180 (320-356) 5-9 secs	For connecting flex circuits to printed circuit boards.
7376-10	40	Au/Ni/Polymer	200	284 – 320 (140 – 160), 7-15 secs	For assembly of flexible printed circuit to camera module devices, flexible printed circuit to polyester-based devices or flexible printed circuit to another flexible printed circuit.
7376-20	35	Au/Ni/Polymer	500	284 – 320 (140 – 160), 7-15 secs	
8794	60	Silver-Coated Filler	1000	302 – 320 (150 – 160), 3-5 secs	Good adhesion to substrates such as ABS, PVC and Melinex®, commonly used to bond and connect micromodules to antennae for Smart Card applications. Also ideal for any applications where fast bond times and reliable connections are required. Stored at room temperature.
9703	50	Silver-Coated Nickel	1000	59 – 158 (15 – 70), PSA	Low outgassing version of 9705.
9705	50	Silver-Coated Nickel	1000	59 – 158 (15 – 70), PSA	Good adhesion; reworkable. For connecting/bonding/grounding flex circuits, printed circuit boards, EMI/RFI shields & gaskets; PSA attachments at room temp. Not recommended for extreme high or low temps. Standard outgassing.

The 3M™ ACF 9000 series is a group of pressure sensitive adhesives. For more precise bond lines, the 3M ACF 5000 and 7000 series are heat bonded.

## PCB Grounding Plane Bonding Film

3M™ Grounded Heat Sink Bonding Film 7373 is an anisotropic electrically-conductive thermoset adhesive film, ideal for bonding and grounding high frequency printed circuit boards, such as cellular base station amplifiers to heat sinks and heat spreaders. Eliminates the need for mechanical fasteners!

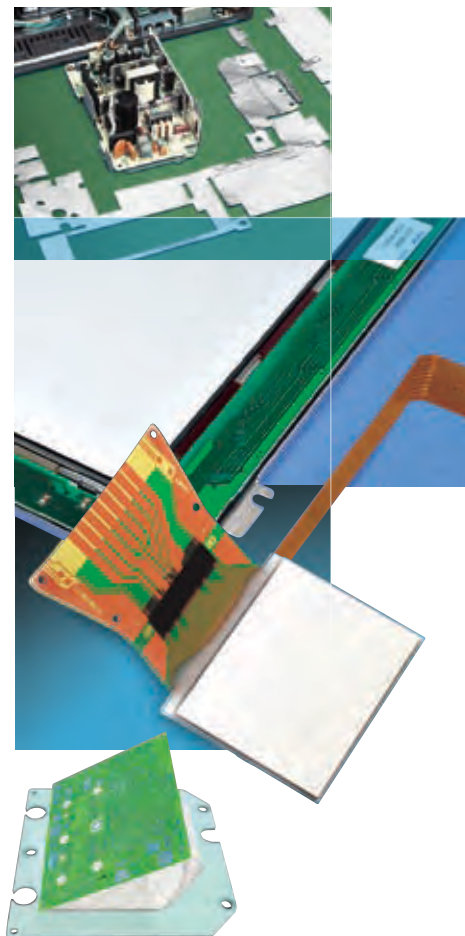
Product	Adhesive Type	Contact Resistance	Thermal Impedance
7373	Epoxy/acrylate	1.0 mΩ, 3M Test Method	0.5°C-in²/W

## 3M™ Transparent Electrically Conductive/EMI Shielding Film 8880-S3, 8880-S7

3M™ Transparent Electrically Conductive/EMI Shielding Film 8880 is a polyester film with an electrically conductive thin film specialty coating. This transparent conductive coating allows high transmission in the visible spectrum and provides EMI shielding in the radio and microwave frequency, a unique combination of properties. Applications include EMI shielding for display screens (PDP, LCD and CRT).

Product	Thickness	EMI Shielding*	Film Surface Resistance*	Transmission %*
8880-S3	3 mil (75μm)	22-26 dB	8-12 ohms	<87.5%
8880-S7	7 mil (175μm)	24-28 dB	8-12 ohms	<87.5%

\* See datapage for test method





## 3M EMI/RFI Shielding, Grounding, Interconnect & Bonding Solutions

### 3M™ Electrically Conductive Adhesive Transfer Tapes XYZ-Axis (Isotropic) Conductivity – Scrim Design

3M™ Electrically Conductive Adhesive Transfer Tapes are designed to help you save time in a variety of specialized electronics assembly operations – from attaching EMI shields and gaskets to grounding and bonding flexible circuits and PCBs – while improving the performance and reliability of your finished products.

**ECATT Basic Comparative Reference Table:** Based on the suggested “ECATT Selection Process”, the end user should identify 2-4 ECATT products to test in an application to determine fitness for use. As each application is unique, it is difficult to identify the “Optimum” ECATT product without testing the ECATT products in an end use assembly design. The ECATT Selection Process of “Good-Better-Best” ranks products as they might perform in a nominal application. As each ECATT may employ different conductive particles, scrim or non-woven, thickness variations, acrylic adhesive type, etc. they will perform differently based on end use application and so the need for the end users own comparative testing. The following technical information and data should be considered representative or typical and should not be used for specification purposes.

**3M ECATT General Overview Comparative Reference Table**

Product	Pictorial Design	Thickness (µm)	Z or XYZ Conductivity (Based on 3M Test Method)	Conductive Filler Type	Adhesive Type	Features, Advantages, and Benefits	Contact Resistance (R ohms) between a Copper foil test panel and a 2nd Sheet of a Copper foil test panel using the 3M ECATT	Contact Resistance (R ohms) between a Gold Flexible Test Strip and a Gold Pad PCB panel using the 3M ECATT
9703		50	Z	Silver	Low Outgassing Acrylic ECATT	Z- Axis, Low Outgassing	Copper foil bonded to a Copper Foil using the 3M ECATT / 3M 2-point Resistance Test Method / 645mm² Overlap Contact Area / 1 Hr RT Dwell. See note 1.	Gold flex bonded to SS using the ECATT. “Best” results relate to a lower contact R potential on SS. Contact R can vary with SS type tested as the oxide layer thickness on a SS type affects the final R results. See note 1.
9705		50	Z	Silver	Standard Acrylic ECATT	Z-Axis, Standard outgassing version of 9703.	< 0.2	< 0.2
9706		50	Z	Silver	High Adhesion Acrylic ECATT	High Adhesion version of the 9705	< 0.2	< 0.3
9707		50	XYZ	Silver	High Adhesion Acrylic ECATT	High Adhesion, “Bond Line Gap/Slit” EMI Shielding for High Frequency, Low contact R to SS	< 0.2	< 0.3
9709		50	XYZ	Silver	Standard Acrylic ECATT	Standard Adhesion, “Bond Line Gap/Slit” EMI Shielding for High Frequency	< 0.2	< 0.3
9709S		50	XYZ	Silver	Standard Acrylic ECATT	Standard Adhesion, “Bond Line Gap/Slit” EMI Shielding for High Frequency, Low contact R to SS	< 0.2	< 0.2
9709SL		50	XYZ	Silver	Standard Acrylic ECATT	Premium low liner release version of 9709S	< 0.2	< 0.2
7810		150	XYZ	Nickel	High Adhesion Acrylic ECATT	Thicker ECATT for gap filling.	< 1.5	< 10.0
7805		150	XYZ	Silver	Standard Acrylic ECATT	Thicker ECATT for gap filling.	< 1.0	< 0.2
7850		150	XYZ	Carbon	High Adhesion Acrylic ECATT	Higher Thermal Conductivity & Thicker ECATT for gap filling.	< 1.0	< 10.0
7772		66	XYZ	Nickel & Alum DC	Medium Adhesion Acrylic D/C	Double Coated Aluminum foil	< 0.5	< 2.0
9712		125	XYZ	Carbon	Standard Acrylic ECATT	Non-woven conductive scrim & Standard acrylic adhesive.	< 1.5	< 15.0
9713		89	XYZ	Nickel/C	Standard Acrylic ECATT	Lower R non-woven conductive scrim vs. 9712 & Standard acrylic adhesive.	< 0.4	< 7.5
9719		100	XYZ	Nickel/C	Silicone ECATT	Low surface energy silicone adhesive, Higher temperature resistance, Lower R non-woven conductive scrim vs. 9712.	< 1.0	< 20.0
9720		35	XYZ	Nickel/Cu	High Adhesion Acrylic ECATT	Lower R non-woven conductive scrim vs. 9713, Thinner scrim design & Medium adhesion.	< 0.2	< 0.5
9723		60	XYZ	Nickel/Cu	High Adhesion Acrylic ECATT	Lower R non-woven conductive scrim vs. 9713, Thinner scrim design & High adhesion.	< 0.2	< 0.4
9725		50	XYZ	Nickel/Cu	Medium Adhesion Acrylic ECATT	Lower R non-woven conductive scrim vs. 9713 & High adhesion.	< 0.2	< 0.5
9732		100	XYZ	Nickel/Cu	Medium Adhesion Acrylic ECATT	Lower R non-woven conductive scrim vs. 9713, Thicker scrim design & High adhesion.	< 0.2	< 2.5
9760		50	XYZ	Nickel/Cu	High / Low Adhesion Double sided reworkable Acrylic ECATT	Easier rework as greater Face Side to Back Side adhesion delta. Easier rework version of 9725. High and Low adhesion sides.	< 0.2	< 0.8
9780		200	XYZ	Nickel/Cu	High / Low Adhesion Double sided reworkable Acrylic ECATT	Easier rework as greater Face Side to Back Side adhesion delta. Easier rework and thicker version of the 9732. High and Low adhesion sides.	< 0.5	< 5.0

Note 1: Test & performance results will vary based on items such as, but are not limited to: Contact area, Assembly method, Testing conditions, Normal variations in product performance from one mfg. lot to a different mfg. lot of material-along with the normal variations found in a material within a mfg. lot (such as thickness, available conductive material in an actual sample tested, variations in conductive filler materials and uniformity of conductive materials dispersed within a lot of material, variations in adhesives, etc.), Test methods, Environmental aging, Exact test surface material type utilized, etc. The “Copper to Copper” & “Gold Flex to PCB” testing also should be noted for the differences related to the “Contact area” difference in the Test Methods (645 mm² vs. 6 mm²) as this does impact the test results. Testing of ECATT materials and the noted test substrates does not imply that the ECATT is suitable for an end use application of similar materials. End user is responsible to determine if an ECATT and substrate combination is fit for use in their intended end use application.



These long-lasting adhesive transfer tapes can eliminate the need for screws and mechanical fasteners – while allowing the use of lighter, more compact fabric and layered foil shielding materials.

And, unlike other electrically conductive adhesives that can be messy and difficult to handle, sensitive tape that can be hand or machine applied and die cut to virtually any shape!

	Contact Resistance (R ohms) between a Gold Flexible Test Strip and a SS panel using the 3M ECATT	Bond Line EMI Shielding (Bond Line Gap/Slit EMI Shielding Potential)	Potential to improve contact R of a Flex to a PCB grounding locations via improved surface conformability and XYZ conductive potential with an ECATT product type vs. a generic Z-axis only conductive PSA	Adhesion to SS type substrate/3M TM/24hr RT dwell	Ease of Rework based on a standard set of substrates	Thermal Conductivity (W/mK) or an effective Thermal Resistance (C/W) for a given thickness vs a generic Z-Axis only PSA
Product	Gold flex bonded to SS using the ECATT. "Best" results relate to a lower contact R potential on SS. Contact R can vary with SS type tested as the oxide layer thickness on a SS type affects the final R results. See note 1.	Best = High dB EMI Shielding in Bond Line "Gap/Slit"	Contact R between a Flex and a PCB	Peel Strength	ECATT design can effect rework based on acrylic adhesive type & conductive filler type.	Effective Thermal resistance and Thermal Conductivity vs a generic Z-Axis only PSA.
9703	Best		Good	Good	Better	Good
9705	Best		Good	Good	Better	Good
9706	Best		Good	Best	Good	Good
9707	Best	Best	Best	Best	Good	Best
9709	Good	Best	Best	Good	Better	Best
9709S	Best	Best	Best	Good	Better	Best
9709SL	Best	Best	Best	Good	Better	Best
7810	Better	Better	Good	Best	Good	Better
7805	Good	Better	Good	Best	Better	Better
7850	Good	Good	Good	Best	Good	Best
7772	Better	Good	Good	Good	Good	Good
9712	Good	Good	Good	Better	Good	Good
9713	Better	Good	Good	Good	Good	Good
9719	Good	Good	Good	Better	Good	Good
9720	Better	Good	Good	Good	Good	Good
9723	Better	Good	Better	Best	Good	Good
9725	Best	Better	Better	Better	Good	Good
9732	Best	Better	Better	Best	Good	Good
9760	Best	Better	Better	Good	Best	Good
9780	Better	Better	Good	Good	Best	Good



### 3M™ Electrically Conductive Adhesive Transfer Tape (ECATT)

**Selection Process:** Selection of Grounding, EMI Shielding and attachment ECATT's consists of determining several application requirements: For example, an ECATT general selection process could take into consideration items such as, but not limited to:

- 1) Determine contact R target,
- 2) Define contact surface type,
- 3) Adhesion level desired - from High-Medium-Standard Adhesion, and High/Low adhesion sided ECATT's,
- 4) Bond line thickness,
- 5) Z or XYZ conductive type ECATT,
- 6) Operating temperature range and environmental conditions,
- 7) EMI Shielding in bond line "Gap/Slit" for high frequencies,
- 8) Determine contact area for ECATT used for R and adhesion of surfaces,
- 9) Assembly Pressure, temperature and time limits
- 10) After assembly bond line stresses and need for added mechanical support.

These solutions include an innovative line of **3M™ Electromagnetic Compatible Products** that can control electromagnetic interference from internal sources, limit EMI susceptibility from external sources and help manufacturers meet high certification standards around the world.

- Provide electromagnetic compatibility
- Shield or absorb electromagnetic and radio frequency interference
- Ground sensitive electronic components and boards
- Cushion components
- Protect cables
- Provide conductive properties

3M™ EMC Products can provide EMI/RFI shielding and absorbing, static charge grounding, anti-static masking, cushioning, mechanical protection and conductive properties for a wide variety of applications.



## 3M™ Electromagnetic Compatible Products

Product	Backing	Adhesive	Total Thickness mils (mm)	Features	Electrical Resistance (m ohms)	Adhesion to Steel (oz/in (N/cm))	Product Certification
<b>3M™ Aluminum Foil</b>							
300PL	1.9 mil aluminum foil*	Acrylic Non-Conductive	3.0 (0.078)	Economical EMI shielding aluminum foil tape. Excellent adhesion and environmental resistance.	N/A	ASTM D-3330 180° Peel. 78 (8.5 N/cm)	—
1120	2 mil aluminum foil	Acrylic Conductive	4.0 (0.102)	For EMI shielding, static charge draining, grounding. Good for cable wrap. Easily die cut.	9	36 (3.9)	UL 510
1170	2 mil aluminum foil	Acrylic Conductive	3.2 (0.081)	For EMI shielding, static charge draining, grounding. Easily die cut.	10	35 (3.8)	UL 510
AL-25BT	1 mil aluminum foil	Acrylic Conductive	2.4 (0.061)	For EMI shielding, static charge draining, grounding. Easily die cut.	10	31 (3.4)	UL 510
AL-25DC	1 mil aluminum foil	Acrylic Conductive Coated on Both Sides	3.3 (0.084)	For EMI shielding, static charge draining, grounding. Easily die cut.	35	31 (3.4)	—
AL-50BT	2 mil aluminum foil	Acrylic Conductive	3.1 (0.079)	For EMI shielding, static charge draining, grounding. Easily die cut.	10	31 (3.4)	UL 510
1115	5 mil aluminum foil	Acrylic Conductive	7.0 (0.177)	For EMI shielding, static charge draining, grounding. Easily die cut.	5	52 (5.6)	—
<b>3M™ Aluminum Foil Laminated with Polyester Film</b>							
AL-36FR	1 mil aluminum foil + polyester film	Acrylic Conductive	2.4 (0.061)	Foil backing laminated with polyester film. Good resistance to oxidation, solvents and oils. Easily die cut.	20	22 (2.4)	UL 510
AL-36NC	1 mil aluminum foil + polyester film	Acrylic Non-Conductive	2.2 (0.055)	Foil backing laminated with polyester film. Good resistance to oxidation, solvents and oils. Easily die cut.	N/A	20 (2.2)	—
AL-37BLK	1 mil aluminum foil + black matte polyester film	Acrylic Conductive	2.8 (0.071)	Foil backing laminated with polyester film. Matte surface finish. Good electrical insulation, resistance to oxidation, solvents and oils. Easily die cut.	50	31 (3.4)	UL 510
AL-40BLK	1 mil aluminum foil + black glossy polyester film	Acrylic Conductive	2.8 (0.071)	Foil backing laminated with polyester film. Glossy surface finish. Good electrical insulation, resistance to oxidation, solvents and oils. Easily die cut.	50	31 (3.4)	UL 510
<b>3M™ Copper Foil</b>							
508SN	1.4 mil copper foil	Acrylic Non-Conductive	3.2 (0.080)	Economical EMI shielding on a wide range of applications.	N/A	ASTM D-1000 180° Peel. 60 (6.5 N/cm)	—
1125	1.4 mil copper foil	Acrylic Non-Conductive	3.5 (0.089)	For EMI shielding on a wide range of applications. Easily die cut.	N/A	40 (4.4)	UL 510
1126	1.4 mil copper foil	Acrylic Conductive	3.5 (0.089)	For EMI shielding, static charge draining when grounded. Easily die cut.	3	36 (3.9)	MIL-T-47012
1181	1.4 mil copper foil	Acrylic Conductive	2.6 (0.066)	For EMI shielding, static charge draining, grounding. Easily die cut.	5	35 (3.8)	UL 510
1182	1.4 mil copper foil	Acrylic Conductive Coated on Both Sides	3.5 (0.089)	Typically used to bond two surfaces, both physically and electrically. Also can provide EMI shielding, static charge draining, grounding. Easily die cut.	10	35 (3.8)	UL 510
1183	1.4 mil tin-plated copper foil	Acrylic Conductive	2.6 (0.066)	Oxidation resistant for long-term EMI shielding, static charge draining, grounding. Solderable and easily die cut.	5	35 (3.8)	UL 510
1194	1.4 mil copper foil	Acrylic Non-Conductive	2.6 (0.066)	For EMI shielding, static charge draining, grounding. Easily die cut.	N/A	40 (4.4)	UL 510
CU-35C	1.4 mil copper foil	Acrylic Conductive	2.8 (0.07)	For grounding and EMI shielding. Solderable and easily die cut.	5	35 (3.8)	UL 510
<b>3M™ Embossed Foil</b>							
1245	Embossed copper foil	Acrylic Non-Conductive	4.0 (0.102)	For EMI shielding, static charge draining, grounding. Solderable and easily die cut.	1	35 (3.8)	UL 510
1267	Embossed aluminum foil	Acrylic Non-Conductive	5.0 (0.127)	For EMI shielding, static charge draining, grounding. Solderable and easily die cut.	5	35 (3.8)	UL 510
1345	Embossed tin-plated copper foil	Acrylic Non-Conductive	4.0 (0.102)	Oxidation resistant for long-term EMI shielding, static charge draining, grounding. Solderable and easily die cut.	1	45 (4.9)	UL 510
2245	Embossed copper foil	Acrylic Conductive	4.0 (0.102)	For grounding and EMI shielding. Solderable and easily die cut.	1	31 (3.4)	UL 510

\*For information on the copper foil version of 300PL, contact your 3M representative.

## 3M™ Electromagnetic Compatible Products

Product	Backing	Adhesive	Total Thickness mils (mm)	Features	Electrical Resistance (m ohms)	Adhesion to Steel (oz/in (N/cm))	Product Certification
<b>3M™ Metallized Cloth</b>							
2191FR	Nickel on copper-plated polyester ripstop fabric	Acrylic Conductive	5.5 (0.140)	Lightweight, conformable, oxidation resistant and high strength for EMI shielding and grounding. Easily die cut.	3	19 (2.1)	UL 510
AG-2300	Silver-coated polyester fabric	Acrylic Conductive	4.3 (0.110)	Lightweight, conformable, oxidation resistant and high strength for EMI shielding and grounding. Easily die cut.	5	31 (3.4)	—
AU-2190	Gold-coated polyester fabric	Acrylic Conductive	4.3 (0.110)	Lightweight, conformable, oxidation resistant and high strength for EMI shielding and grounding. Easily die cut.	5	31 (3.4)	—
X-7001	Copper-plated polyester ripstop fabric	Acrylic Conductive Coated on Both Sides	4.3 (0.110)	Typically used to bond two surfaces, both physically and electrically. Also can provide EMI shielding, static charge draining, grounding. Lightweight, conformable and easily die cut.	15	59 (6.4)	—
CN 3190	Nickel on copper-plated polyester ripstop fabric	Acrylic Conductive	4.3 (0.110)	Lightweight, conformable, oxidation resistant and high strength for EMI shielding and grounding.	1	35 (3.8)	—

<b>3M™ Mesh and Sleeving</b>							
DS & FS Series	Braided glass fibers overwound with tin-plated copper foil	None	N/A	EMI mesh sleeves for cables and harnesses. Excellent strain relief and heat stability, flexible, oxidation resistant. Solderable.	N/A	N/A	UL VW-1 (UL FR-1)
VA Series	Sleeves braided with polyester fibers and polyester fibers over-wound with tin-plated copper foil	None	N/A	EMI mesh sleeves for cables and harnesses. Excellent strain relief and heat stability, flexible, oxidation resistant. Solderable, lightweight.	N/A	N/A	—

<b>3M™ EMI Shielding Sheets and Films</b>							
1380	High-metal magnetic sheet between polymer film layers	Rubber Thermo-setting	11.8 (0.300)	Excellent high-μ magnetic shielding at low frequency. Soft magnetic sheet sandwiched between layers of film. Thin, flexible, lightweight and easily die cut.	N/A	N/A	—
AL-10S	Epoxy FR film + aluminum foil	None	7.8 (0.198)	Softened aluminum foil with flame-retardant film on one side. Excellent EMI shielding for PCBs and assemblies. Lightweight, flexible and easily die cut.	N/A	N/A	UL 510
AL-1010S	Double epoxy FR film + aluminum foil	None	13.8 (0.351)	Softened aluminum foil with flame-retardant film on both sides. Excellent EMI shielding for PCBs and assemblies. Lightweight, flexible and easily die cut.	N/A	N/A	UL 510
CU-10S	Epoxy FR film + copper foil	None	6.7 (0.170)	Softened copper foil with flame-retardant film on one side. Excellent EMI shielding for PCBs and assemblies. Lightweight, flexible and easily die cut.	N/A	None	UL 94 V0
CU-1010S	Copper foil + double epoxy film	None	11.8 (0.300)	Softened copper foil with flame-retardant film on both sides. Excellent EMI shielding for PCBs and assemblies. Lightweight, flexible and easily die cut.	N/A	None	—

<b>3M™ Gaskets and Conductive Materials</b>							
3245	Reverse embossed copper foil	Acrylic Conductive	5.9 (0.150)	For EMI shielding, static charge draining, grounding. Solderable, easily die cut.	1	46 (5.0)	UL 510

<b>3M™ Absorbing Materials</b>							
AB-2000 Series	Silicone rubber with magnetic filler	Acrylic Conductive	10.6-62.2 (0.27-1.58)	EMI absorbing: can suppress radiated noise in broadband frequency. Thin, flexible and easily die cut. In 7 standard thicknesses.	N/A	35 (3.8)	—

3M offers a wide range of EMI/RFI shielding tapes and absorbing materials, mesh and sleeving products, gaskets and conductive materials.





**Personal Computer Memory Cards –**  
3M™ Bonding Films provide a bond stronger than high strength pressure sensitive tapes. Bonding film adheres stainless steel lids to the connectors and plastic frames.



## 3M™ Bonding Films

3M™ Bonding Films combine some of the best features of 3M film and hot melt adhesive technologies, providing excellent performance on a variety of substrates ranging from fabrics, polyolefins and liquid crystal polymers to temperature sensitive materials and metals. Choice of bond strengths ranges from temporary to permanent.

### Features and benefits:

- Precise, uniform film thicknesses allow consistent bond lines
- Available in precise die-cut shapes and sizes, for neat manual or automated application
- Bonds in seconds with heat to help eliminate fixturing. Speeds assembly.
- Provides a dielectric insulating layer
- Choice of overlap shear strength on aluminum as high as 2500 psi

Product Number	Base Resin	Color	Caliper mils	Bond/Cure Time	Bondline Temp. °F (°C)	Approx. Percent Elongation	Overlap Shear Strength	180° Peel Strength piw	Description
406	EAA	Clear	3.0	2-5 sec	320 (160)	750	1090 on Al	16.6 on SS	Flexible, light-colored thermoplastic bonding film exhibits good adhesion to a variety of substrates, especially metals.
583	Nitrile Phenolic	Brown	2.0	2-5 sec	250 (121)	800	630 on Al	10 on Al	Heat or solvent-activated dry film adhesive
588	Nitrile Phenolic	Yellow	6.0	2-5 sec	250 (121)	250	880 on Al	20 on Al	Heat-activated dry film adhesive
615	Polyester	Tan	2.5 & 4.0	2-5 sec	280 (138)	300	810 on Al	15 on Al	Flexible, light-colored thermoplastic bonding films exhibit good adhesion to a variety of substrates.
615R	Polyester	Tan	6.0	2-5 sec	280 (138)	300	810 on Al	15 on Al	Flexible, light-colored thermoplastic film has good adhesion to a variety of substrates.
615S	Polyester	Tan	6 & 9	2-5 sec	280 (138)	300	810 on Al	15 on Al	Scrim version of 615
615ST	Polyester	Tan	7.5 & 10	2-5 sec	280 (138)	300	810 on Al	15 on Al	615S with tacky PSA dots for attachment
620	Polyester	Tan	6.0	2-5 sec	280 (138)	100	825 on Al	16 on SS	Three layer bonding film consisting of a 2 mil polyester film core coated on both sides with 2 mil of a polyester based thermoplastic adhesive including a dielectric insulating layer.
668	Polyester	Tan	4.0	2-5 sec	320 (160)	1000	860 on Al	20 on SS	Flexible, light-colored thermoplastic film is tacky at room temperature and has good adhesion to a variety of substrates at elevated temperatures.
690	Polyester	Tan	8.0	2-5 sec	280 (138)	300	810 on Al	15 on Al	Good adhesion to a variety of substrates.
690T	Polyester	Tan	8.0	2-5 sec	280 (138)	300	810 on Al	15 on Al	690 with tacky PSA dots for attachment
790	Polyamide	Tan	4.0 & 8.0	2-5 sec	290 (143)	300	850 on Al	17 on Al	Excellent adhesion to many substrates, including metal. Excellent heat resistance.
AF-42	Epoxy	Translucent	3.0	60 min	350 (177)	250	4600	55	Excellent heat resistance and structural bond strength.
AF-111	Epoxy	Off-White	10.0	60 min	250 (121)	10	5300	38	Excellent heat resistance and structural bond strength.

## 3M™ Protective Tapes

3M™ Protective Tapes are designed to provide short-term protection for critical surfaces, such as LCD displays, high-gloss coated metals and glass, against scratches and marring during manufacturing, packaging and shipping.

Product/Color	Tape Structure Backing/Adhesive	Backing Thickness mils (mm)	Total Thickness mils (mm)	Adhesion to Steel oz./in. (N/100mm)	Tensile Strength lbs/in. (N/100mm)	Elongation at Break %	Temp. Range °F (°C)	Comments
ASTM Test Method		D-3652	D-3652	D-3300	D-3759	D-3759		
335/Pink	Polyester Film/Rubber	0.9 (0.02)	1.6 (0.040)	2 (2)	24 (420)	125	-60 – 150 (-50 – 66)	Low tack protective tape.
336/Transparent	Polyester Film/Rubber	0.9 (0.02)	1.4 (0.036)	1 (1)	24 (420)	90	-60 – 150 (-50 – 66)	Low tack protective tape.
1614/Clear	Polyester/Acrylic	n/a	1.3 (0.03)	2 (2)	24 (420)	88	*up to 300 (150)	Low tack, high temperature tape for smooth surfaces.
2A12/Clear	Co-Extruded Acrylic	n/a	2 (0.05)	4 (4)	7 (123)	600	*up to 160 (71)	Low tack protective tape.
2A26/Clear	Co-Extruded Acrylic	n/a	2 (0.05)	9 (10)	7 (123)	600	*up to 160 (71)	Medium tack protective tape.
2A89/Clear	Co-Extruded Acrylic	n/a	2 (0.05)	15 (16)	7 (123)	600	*up to 160 (71)	High tack protective tape.
3130/Clear	Polyethylene/Rubber	n/a	3 (0.08)	**14 (15)	6 (105)	450	*up to 130 (54)	No tack – bonds to itself

Product/Color	Tape Structure	Tape Thickness mils	Liner	Liner Thickness mils	Adhesive	Key Characteristics
FVS14S/Clear	Static Cling Vinyl	7.5	Clear Polyester Liner	3.0	None	3M™ Static Cling Label Materials are highly-plasticized vinyl label materials, available in white or clear, that adhere to most clean, smooth surfaces such as glass, painted metal, and most smooth plastics without the use of pressure sensitive adhesives, and utilize a non-silicone coated liner specially designed for static cling vinyl. Liner for 3M label product FVS14S has a non-silicone coated liner specially designed for static cling vinyl and is used when high strength and caliper control are important. FVS14S is recommended where high clarity of the product is critical.

\*Dependent on dwell time. Contact 3M Polymask tech services for details at 1-800-241-2031. \*\* Value measured as a cohesive bond strength in units.



## 3M™ High Temperature Tapes

3M™ High Temperature Tapes provide masking protection for a variety of applications and can withstand temperature ranges from -100°F (38°C) up to 500°F (260°C). Take a look at the selection guide below to choose the high temperature tape that will work for you.

Product\Color	Tape Structure Backing/ Adhesive	Total Thickness mils (mm)	Adhesion to Steel oz./in. (N/100mm)	Tensile Strength lbs/in. (N/100 mm)	Elongation at Break %	Temp. Range °F (°C)	Comments
ASTM Test Method		D-3652	D-3300	D-3759	D-3759		

### Scotch® High Performance Masking Tape

High Performance Tape 213	Crepe Paper/ Rubber	6.5 (0.16)	41 (45)	30 (525)	9	Up to 350 (177) for 30 min	High temperature; good on anodized aluminum.
High Performance Masking 2693	Mini-Crepe Paper/Synthetic	8.5 (0.21)	46 (50)	26 (455)	10	Up to 325 (163) for 30 min	Very aggressive holding for multibake paint cycles.

### Scotch® High Temperature Vinyl Masking Tapes

Fine Line 4737S	Opaque Blue Vinyl Film/ Rubber	5.1 (0.13)	14 (15)	14 (245)	150	Up to 325 (163) Up to 1 hour	High temperature.
Fine Line 4737T	Translucent Blue Vinyl Film/ Rubber	5.1 (0.13)	14 (15)	17 (297)	150	Up to 325 (163) Up to 1 hour	Cost effective. High temperature performance.

### 3M™ Circuit Board Fabrication Tapes

Circuit Plating Tape 851/Green	Polyester/ S/R Blend	3.6 (0.09)	29 (27)	27 (476)	124	40 – 170 (4 – 77)	Performance. Silicone plating.
Circuit Plating Tape 1278/Blue	Polyester/ Rubber	2.8 (0.07)	31 (34)	25 (431)	116	40 – 170 (4 – 77)	SMOBC masking. Non-silicone adhesive.
Circuit Plating Tape 1279/Orange	Polyester/ S/R Blend	4.1 (0.10)	34 (37)	25 (438)	120	40 – 170 (4 – 77)	Economy. Silicone plating.
Circuit Plating Tape 1280/Red	Polyester/ S/R Blend	3.6 (0.09)	31 (34)	30 (525)	135	40 – 170 (4 – 77)	Performance. Silicone plating.
General Purpose Vinyl 4731/Purple	Vinyl/Rubber	7.0 (0.18)	20 (22)	18 (315)	245	40 – 170 (4 – 77)	Electroplating. Flame retardant and weather resistant.

### 3M™ High Temperature Tapes

Polyimide 5413/Amber	Polyimide/ Silicone	2.7 (0.07)	20 (22)	33 (578)	60	-100 – 500 (-73 – 260)	High temperature film.
Water Soluble 5414/Transparent	PVA/ Synthetic	2.5 (0.06)	7 (8)	6.2 (116)	98	0 – 500 (-18 – 260)	Water soluble.
Low Static Polyimide 5419/Amber	Polyimide/ Silicone	2.7 (0.07)	20 (22)	33 (578)	60	-100 – 500 (-73 – 260)	Low static wave solder.
Low Static Polyimide 5433/Amber	Polyimide/ Silicone	2.7 (0.07)	20 (22)	33 (578)	60	-100 – 500 (-73 – 260)	Lined 5419 tape.
General Purpose Polyimide 7413D/Amber	Polyimide/ Silicone	2.6 (0.07)	25 (24)	25 (460)	40	-100 – 500 (-73 – 260)	No residue after reflow.
General Purpose Polyimide 7413T/7413TL/Amber*	Polyimide/ Silicone	2.5 (0.06)	25 (27)	30 (525)	60	-100 – 500 (-73 – 260)	High temperature performance.
Low Static, Non-Silicone Polyimide 7419	Polyimide/ Acrylic	1.8 (.046)	—	33 (578)	60	Up to 500 (260)	Non silicone, low static.

\*Only available in log roll.



## 3M™ Optically Clear Adhesive Tapes

3M™ Optically Clear Adhesives are formulated specifically for electronic displays. These transparent, film-free isotropic adhesives allow accurate color and full display brightness, while providing a long-lasting, high strength bond.

### Visual Accuracy

- Light transmission >99% when corrected for reflection losses
- Haze level <3%
- Free of birefringence
- Refractive index of 1.47 - 1.49
- Specifically designed and manufactured to eliminate common adhesive visual defects, such as bubbles, dirt and gels

### Durable Adhesion

3M™ Optically Clear Laminating Adhesives are based on the latest in a series of developments for specific adhesive applications. Building on 3M adhesive technology, the industry standard for graphic attachment and membrane switch assembly, optically clear adhesives are formulated with the following performance characteristics:

- High cohesive and peel strengths, for reliably bonding most transparent film substrates to glass
- Controlled caliper providing uniform bond line thickness
- High temperature, humidity and UV light resistance
- Long term durability without yellowing, delaminating or degrading



These products have an Adhesive Transfer Tape backing/adhesive structure.



Product Number	Adhesive Thickness mils (micron)	20 min Dwell Adhesive to Glass oz./in	Operating Temperature Range °F (°C)	Comments
ASTM Test Method	D-3652	D-3330-E		
8171	1 (25)	39	-40 – 185 (-40 – 85)	High adhesion build to polar surfaces. Specifically designed for outgassing substrates like polymethylmethacrylate (PMMA) and polycarbonates (PC).
8172	2 (51)	42	-40 – 185 (-40 – 85)	
8173D	3 (76)	60	-40 – 185 (-40 – 85)	Double coated. 1.0 mil adhesive/1.0 mil PET/1.0 mil adhesive. Same applications as 8171.
8211	1 (25)	54	-40 – 185 (-40 – 85)	General purpose, high adhesion, optically clear adhesive.
8212	2 (51)	65	-40 – 185 (-40 – 85)	
8213*	3 (76)	69	-40 – 185 (-40 – 85)	
8214*	4 (102)	67	-40 – 185 (-40 – 85)	
8215*	5 (127)	69	-40 – 185 (-40 – 85)	
8271	1 (25)	48	-40 – 185 (-40 – 85)	Bare ITO compatible optically clear adhesive
8271S	2 (51)	46	-40 – 185 (-40 – 85)	
8272	2 (51)	57	-40 – 185 (-40 – 85)	
8273	3 (76)	67	-40 – 185 (-40 – 85)	
8273D	3 (76)	60	-40 – 185 (-40 – 85)	
8274	4 (102)	80	-40 – 185 (-40 – 85)	
8275	5 (127)	80	-40 – 185 (-40 – 85)	

\*Made to order. Longer lead time required.

D = Double Coated OCA

## 3M™ Contrast Enhancement Film

3M™ Contrast Enhancement Film is a new pressure sensitive adhesive technology that provides crystal clear, high reliability optical coupling and mechanical joining for various transparent materials.

This advanced, optical-grade adhesive offers a number of significant performance and productivity-enhancing advantages:

### Contrast Enhancement

When 3M Contrast Enhancement Film is applied between the cover lens and display module, 3M tests show a 4 to 7x improvement in image quality, compared to displays using an air gap. This greatly enhances visibility in bright, outdoor environments.

### Exceptional Clarity

Tailored refractive index enables light coupling to your specific display requirements.

### High Purity

Unlike conventional non-cleanroom adhesives, 3M Contrast Enhancement Film has no contaminants, such as bubbles, gels, or particles, that can contribute to optical and visual defects.

### Easy to Apply

Custom pre-cut adhesive transfer film is delivered between two sheets of release coated polyester film, for easy application.

- Construction provides uniform caliper and easy release of supporting films
- Simplifies assembly process and increases productivity
- Available in custom shapes and sizes to order for custom design

### Speeds Assembly Time

In contrast to suitable liquid adhesives, 3M Contrast Enhancement Film has less contamination, and requires less processing time, increasing productivity during assembly. Assembly in a Class 10,000 or better cleanroom is recommended.

### Meets Environmental Aging Requirements

3M Contrast Enhancement Film performs in high temperature and high humidity environments and is also UV resistant – may need to drop UV resistant claim SBC will check with lab.

### Contrast Improvement by 3M™ Contrast Enhancement Film

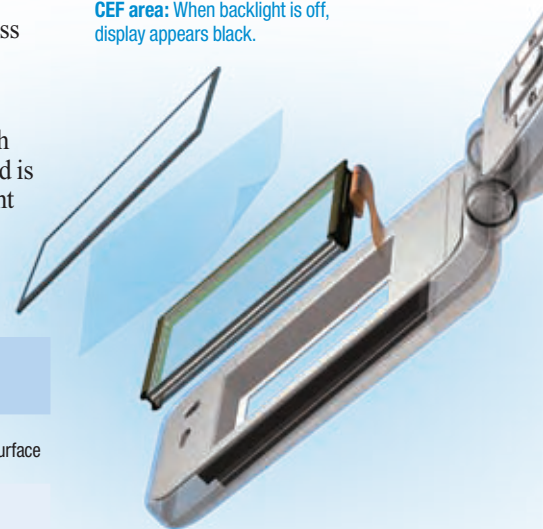


#### Cross-Section

PMMA	
Air	CEF
LCD	

**Air area:** When backlight is off, display appears more gray (instead of black).

**CEF area:** When backlight is off, display appears black.



### 3M™ Contrast Enhancement Film

Product Number	Adhesive Thickness mils (micron)	Peel Adhesion to Glass (oz/in)	PET Release Film <sup>2</sup>	Refractive Index	Haze (%)	Coating/Processing Environment	Typical Application <sup>1</sup>
CEF0705	5 (127)	75	2.0 mil/2.0 mil	1.487	0.1	Cleanroom	Gap filling, 'Bare' ITO Surface
CEF0707	7 (178)	84	2.0 mil/2.0 mil	1.487	0.1		
CEF0805	5 (127)	84	2.0 mil/2.0 mil	1.473	0.8		
CEF0807	7 (178)	85	2.0 mil/2.0 mil	1.473	0.8		Gap filling, high adhesion
CEF08A05	5 (127)	110	2.0 mil/2.0 mil	1.473	0.2		
CEF08A07	7 (178)	115	2.0 mil/2.0 mil	1.473	0.2		
CEF0910	10 (254)	106	3.0 mil/3.0 mil	1.471	0.8		Gap filling, PMMA substrate

Note 1: Rigid to rigid surface bonding application; flat or textured fabric surface.

Note 2: All products are also available with 5 mil liner on one side upon request.

### Contrast Improvement by 3M™ Contrast Enhancement Films

	Air Area			CEF Area		
	Brightness of Black (cd/m <sup>2</sup> )	Brightness of White (cd/m <sup>2</sup> )	Contrast*	Brightness of Black (cd/m <sup>2</sup> )	Brightness of White (cd/m <sup>2</sup> )	Contrast
Dark	0.571	254.4	445.5	0.553	271.5	491.0
Room Light <sup>1</sup>	6.268	265.6	42.4	0.980	279.5	285.2
Room Light + Desk Light <sup>2</sup>	11.70	276.2	23.6	2.177	305.0	140.1

Illuminance of measurement point: 1) 360 lx, 2) 2000 lx by TOPCON TECHNOHOUSE CORP. BM -7

\* Individual results will vary by display.

Data on this page may not be representative of all applications.

NOTE: The technical information and data on these pages should be considered representative or typical only and should not be used for specification purposes.

\* Rolls more than 10" wide require 14 days



Configuration available

Available for test sell

### Double-Coated Construction

Carrier	Mils
Clear Polyester	0.5, 1.0, 2.0, 3.0, 5.0, 7.0
White Polyester	1.0, 2.0, 3.0 <sup>††</sup>
Black Polyester	0.5
White Polypropylene	3.5

<sup>††</sup> 2-mil vapor coated also available for 100, 300, 350 and 400 adhesive families

## Electronic Thin Attachment Films 3M™ Adhesive Transfer and Double-Coated Tapes

Enhanced appearance, improved performance, improved process... if you think these benefits can help you bring a better, more competitive product to market, you'll want to evaluate the many pressure sensitive adhesive bonding tapes from 3M. You can rely on 3M for a comprehensive and versatile line of bonding tapes, and we'll help you find solutions for any one of thousands of material combinations.

### R<sup>3</sup>: Rapid. Responsive. Reliable.

Through the R<sup>3</sup> Custom Program, 3M can help you **rapidly respond** with **reliable** custom solutions for jobs ranging from gasketing and durable graphic attachment to laminating in high temperature electronics applications.

You can more rapidly meet your customer specifications and expectations with custom combinations of 3M components you know and trust. And 3M adhesives, liners, and carriers are stocked in depth and backed with the experience to get what you need right and fast. How fast?

- Pricing and feasibility in 1 day
- Customized sample rolls up to 10" wide shipped within 7 days\*
- Order shipped within 21 days

Use the R<sup>3</sup> Component Matrix to check adhesive/liner/carrier compatibility. Then find adhesive and liner details in the chart below.

Minimum orders start at only 1.5 million square inches or five master rolls by 180 yards.

If you don't see what you want, just consult with your 3M representative and the R<sup>3</sup> technical team will start on the right solution right away.

### R<sup>3</sup> Product Matrix

Use the table below to check for compatibility with adhesive, thickness, and liner. And remember, if you don't see what you're looking for, just ask your 3M representative and we'll put the best minds in the adhesive industry on your challenge right away. It's what R<sup>3</sup> is all about – finding the right solution for you, right away. Please refer to the R<sup>3</sup> brochure (70-0711-1147-3) for additional information.

	55# Densified Kraft 3.2 mils				58# Polycoated Kraft 4.0 mils				83# Polycoated Kraft 6.2 mils				76# Extensible Kraft 6.0 mils				Polyester 2.0 mils			
Adhesive	0.5	1.0	2.0	30-100	0.5	1.0	2.0	30-100	0.5	1.0	2.0	30-100	0.5	1.0	2.0	30-100	0.5	1.0	2.0	30-100
100*																				
100MP**																				
200MP**																				
220**																				
300																				
300LSE**																				
300MP**																				
300MP <sup>†</sup>																				
350																				
400																				
420**																				

• Double-liner constructions are outside the matrix.

\* Cannot be used in double-coated construction

\*\* 1.5 mil minimum for double-coated construction

<sup>†</sup> Low fogging for automotive applications



# Electronic Thin Attachment Films

## 3M™ Adhesive Transfer and Double-Coated Tapes

			Liner			Adhesion*					Chem Temp Range		
Product	Description/ Application Ideas	Adhesive Caliper mils	Type	Caliper mils	Master Size	Specs	Metal	HSE Plastic	LSE Plastic	Foam	Resist	Low °F (°C)	High °F (°C)
3M™ High Temperature Acrylic Adhesive 100MP													
F9460PC	High performance industrial joining and metal fabrication.	2	58# PCK	4.2	60" x 180 yds	UL	10	7	1	2	10	-40 (-40)	500 (260)
F9469PC		5	58# PCK	4.2	60" x 180 yds	UL	10	7	1	2	10	-40 (-40)	500 (260)
F9473PC		10	58# PCK	4.2	60" x 180 yds	UL	10	7	1	2	10	-40 (-40)	500 (260)
3M™ Ultra-High Temperature Acrylic Adhesive 100HT													
9082	Excellent heat resistance in high-temp environments.	2	White DK liner	3.2	48" x 180 yds	—	10	7	1	2	10	-40 (-40)	530 (276)
9085		5	White DK liner	3.2	48" x 180 yds	—	10	7	1	2	10	-40 (-40)	530 (276)
3M™ High Performance Acrylic Adhesive 200MP													
467MP	Industry standard for graphic attachment, general industry joining and die cut parts.	2	58# PCK	4.2	48" x 180 yds	UL M***	10	9	1	3	9	-40 (-40)	400 (204)
468MP		5	58# PCK	4.2	48" x 180 yds	UL M***	10	9	1	3	9	-40 (-40)	400 (204)
3M™ High Tack Acrylic Adhesive 300													
927	Attach gaskets and a variety of industrial foam materials.	2	60# DK	3.5	48" x 180 yds	—	7	9	9	9	6	-40 (-40)	250 (121)
950		5	60# DK	3.5	48" x 180 yds	UL	7	9	9	9	6	-40 (-40)	250 (121)
3M™ Low Surface Energy Acrylic Adhesive 300LSE													
9453LE	Bonds graphics to powder coatings, LSE plastics and oily materials.	3.5	58# PCK	4.2	54" x 180 yds	UL	9	10	10	1	7	-40 (-40)	300 (148)
9471LE		2	58# PCK	4.2	54" x 180 yds	UL	9	10	10	1	7	-40 (-40)	300 (148)
9472LE		5	58# PCK	4.2	54" x 180 yds	UL	9	10	10	1	7	-40 (-40)	300 (148)
3M™ High Tack Acrylic Adhesive 300MP													
9770	Economical bonding for LSE materials and for lamination to open and closed cell foams.	2	58# PCK	4.2	48" x 180 yds	M***	7	7	8	8	7	-40 (-40)	250 (121)
6035PC	Resists fogging for automotive interior fabric joining applications.	5	58# PCK	4.2	60" x 180 yds	—	7	7	8	8	7	-40 (-40)	250 (121)
3M™ High Performance Acrylic Adhesive 350													
9482PC	High tack and shear strength; excellent adhesion to plastics and foams.	2	62# PCK	4.2	48" x 180 yds	UL	9	10	10	9	8	-40 (-40)	450 (232)
9485PC		5	62# PCK	4.2	48" x 180 yds	UL	9	10	10	9	8	-40 (-40)	450 (232)
3M™ Acrylic Adhesive 420													
F9752PC	High tack, can be applied in temperatures as low as 32°F (0°C).	2	58# PCK	4.2	54" x 360 yds	—	7	7	8	4	6	-40 (-40)	450 (232)
F9755PC		5	58# PCK	4.2	54" x 360 yds	—	7	7	8	4	6	-40 (-40)	450 (232)

\*Adhesion levels of 1-10, ten being the highest.

\*\*Double coated with non-woven carrier

\*\*\*M means Mil-P-19834B Type 1



# Electronic Thin Attachment Films

## 3M™ Adhesive Transfer and Double-Coated Tapes

				Liner		Adhesion*						Chem Temp Range		
Product	Description/ Application Ideas	Tape Caliper mils	Carrier Type	Type	Caliper mils	Master Size	Specs	Metal	HSE Plastic	LSE Plastic	Foam	Resist	Low °F (°C)	High °F (°C)
3M™ High Performance Acrylic Adhesive 200MP														
9492MP	Double-coated version of transfer tape 468MP. Offers improved handling and ease of die cutting.	2.5	PET	58# PCK	4.2	48" x 180 yds	—	10	9	1	2	9	-40 (-40)	400 (204)
9495MP		5.7	PET	58# PCK	4.2	54" x 180 yds	UL	10	9	1	2	9	-40 (-40)	400 (204)
3M™ Low Surface Energy Acrylic Adhesive 300LSE														
9495LE	Double-coated version of transfer tape 9472LE. Improved handling and ease of die cutting.	6.7	PET	58# PCK	4.2	54" x 180 yds	UL	9	10	10	1	7	-40 (-40)	300 (148)
3M™ High Tack Acrylic Adhesive 300MP														
9690	For foam lamination, graphic attachment and cell phone lens attachment.	5.6	PET	83# PCK	6.2	54" x 180 yds	—	7	7	8	9	7	-40 (-40)	250 (121)
3M™ Differential Adhesive 300MP/300LSE														
9490LE	Adhesive 300MP for foam laminating. Adhesive 300LSE bonds to powder coated metals, oily metals and LSE plastics.	6.7	PET	58# PCK	4.2	54" x 180 yds	—	7	7	8	8	7	-40 (-40)	250 (121)
								9	10	10	1	7	-40 (-40)	300 (148)
3M™ High Performance Acrylic Adhesive 350														
9500PC	High performance with good chemical resistance.	5.6	PET	61.5# PCK	4.5	48" x 108 yds	—	9	10	10	9	8	-40 (-40)	450 (232)
3M™ High Performance Acrylic Adhesive 350/Silicone Differential														
9731	Differential adhesive — silicone adhesive on face side. Silicone keypad attachment, printer toner cartridge refurbishing.	5.5	PET	PET/ PCK	2.9/5.0	38" x 108 yds	—	9	10	10	9	8	-40 (-40)	450 (232)
3M™ Acrylic Adhesive 420														
9783	For cell phone lens attachment, foam lamination and graphic attachment.	3.5	PET	PET	2.0	54" x 180 yds	—	7	7	8	4	6	-40 (-40)	450 (232)
9795		5.6	PET	83# PCK	6.2	54" x 180 yds	—	7	7	8	4	6	-40 (-40)	450 (232)

\*Adhesion levels of 1-10, ten being the highest.



# Tape Selection Guide

## Adhesive Family Characteristics

Product	Characteristic
<b>100 High Temperature Acrylic</b>	<ul style="list-style-type: none"> <li>• Up to 450°F short-term heat resistance and excellent solvent resistance</li> <li>• High peel strength compared to other acrylic formulations</li> <li>• Exceptional shear strength even at elevated temperatures</li> <li>• Exhibits low outgassing characteristics</li> </ul>
<b>100MP High Performance Acrylic</b>	<ul style="list-style-type: none"> <li>• Up to 500°F short-term heat resistance and outstanding solvent resistance</li> <li>• Higher peel strength than most other acrylic formulations</li> <li>• Exceptional shear strength even at elevated temperatures</li> </ul>
<b>100HT Ultra High Temperature Acrylic</b>	<ul style="list-style-type: none"> <li>• Up to 550°F short-term heat resistance and outstanding solvent resistance</li> <li>• Higher peel strength than most other acrylic formulations</li> <li>• Exceptional shear strength even at elevated temperatures</li> </ul>
<b>200MP High Performance Acrylic</b>	<ul style="list-style-type: none"> <li>• Up to 400°F short-term heat resistance and excellent solvent resistance</li> <li>• Outstanding adhesion to metal and high surface energy plastics</li> <li>• Excellent shear strength to resist slippage and edge lifting</li> <li>• Short term repositionability for placement accuracy</li> </ul>
<b>300 High Tack Acrylic</b>	<ul style="list-style-type: none"> <li>• Up to 250°F short-term heat resistance</li> <li>• High initial adhesion, especially to low surface energy plastics</li> <li>• Quick flowing to speed lamination of textured plastics, foams, fabrics and coated papers</li> </ul>
<b>300LSE Low Surface Energy Acrylic</b>	<ul style="list-style-type: none"> <li>• Up to 300°F short-term heat resistance</li> <li>• Outstanding adhesion to low surface energy plastics, powder coated paints and lightly oiled metals</li> <li>• Good chemical and humidity resistance</li> </ul>
<b>300MP High Tack Acrylic</b>	<ul style="list-style-type: none"> <li>• Up to 250°F short-term heat resistance for automotive interior applications</li> <li>• Designed especially to bond most plastics and foams</li> <li>• Economical attachment of graphics</li> </ul>
<b>350 High Performance Acrylic</b>	<ul style="list-style-type: none"> <li>• Up to 450°F short-term heat resistance</li> <li>• Excellent solvent resistance and adhesion to LSE materials</li> </ul>
<b>420 Acrylic Adhesive</b>	<ul style="list-style-type: none"> <li>• Up to 450°F short-term heat resistance</li> <li>• High tack adhesive</li> </ul>





### Technology and capability for identifying, informing, tracking, warning, protecting, and securing.

With 3M adhesives, topcoats, facestocks and liners, you can mix and match to achieve about 150,000 combinations. That means technology and solutions for most labeling requirements for notebook and desktop computers, printers, peripherals, mobile phones, and more. 3M also helps you put that technology to work just about anywhere in the world with global service, expertise, and a customer-focused attitude.

- Trained sales and technical team representing years of materials and application experience
- Application Development Specialists to help customers optimally mix and match label materials
- Broad customization capability in the performance labels industry
- Testing laboratory for label properties and performance
- Custom quotation within 48 hours anywhere in the world
- Samples available



**For information  
or samples,  
please contact  
3M Performance Label  
800-422-8116**

## 3M™ Performance Label Materials

### Applications and general properties of 3M™ Performance Label Materials

Application	Unique Application Needs	Product Family/Description	Product	Thickness (Face/Adhesive only) mils	Color	
Identifying/Informing/Warning						
Certification, Instruction, or Warning Label	Thermal transfer printable, with adhesion to difficult surfaces for life of the product.	Thermal Transfer Polyester with High Holding Adhesive 350	7871	3.8	Gloss white	
			7868	3.1	Gloss white	
		Thermal Transfer Polyester with High Performance Adhesive P1650	7872	3.8	Matte platinum	
			FM033202	3.3	Gloss white	
Identification and Information Label	Cost effective thermal transfer printable, with adhesion to many surfaces for life of the product.	Thermal Transfer Polyester with High Precision Adhesive 310	FM043702	3.3	Matte silver	
			7815	3.1	Matte white	
			7816	2.8	Gloss white	
	Low cost, general purpose thermal transfer label material with adhesion to many surfaces for life of the product.	Thermal Transfer Polyester with High Performance Adhesive P1400	7818	4.1	Matte silver	
			7875	2.8	Platinum	
			OFM03402	2.9	Gloss white	
Recyclable Label	Label stock is recycling compatible with PC, ABS, PS, HIPS & PC/ABS plastics. Thermal transfer printable.	Recycling Compatible ABS with High Holding Adhesive 350	OFM03502	2.9	Matte white	
			8000	4.2	Matte white	
Re-work Label	Permanent yet cleanly removable on many substrates. Low-outgassing adhesive resists flagging and edge lifting on disk drive applications.	Thermal Transfer Polyester with Removable Adhesive 550	5770	3	Matte white	
			5770NF	3	Matte white	
			5771	3	Gloss white	
			5771NF	3	Gloss white	
			5772	3	Gloss white metalized	
Tracking						
Inventory Control Label	Cost effective thermal transfer printable, with adhesion to many surfaces for life of product.	Thermal Transfer Polyester with High Precision Adhesive 310	7815	3.1	Matte white	
			7816	2.8	Gloss white	
			7875	2.8	Platinum	
	Low cost, general purpose thermal transfer label material with adhesion to many surfaces for life of the product.	Thermal Transfer Polyester with High Performance Adhesive P1400	OFM03402	2.9	Gloss white	
			OFM2402	2.9	Matte silver	
PCB Tracking Label	Barcode printable with high temperature resistance. Survives solder processing.	High Temperature Polyimide (Kapton™) with High Temp Adhesive 100	7811-DMI	4.0	Matte white	
			7812-TT	4.0	Matte white	
	High temperature resistance. Thermal transfer printable.	High Temperature Acrylate with High Temp Adhesive 150	3921	3.2	Matte white	
Laser Markable Label Material	Laser etchable film, durable label construction. May be suitable for DoD UID - A "unique identifier" containing data elements used to track Department of Defense parts through their life cycles.	Laser Etch Acrylate with High Holding Adhesive 350	7847	3.6	Matte black on white	
			7848	3.6	Matte silver on black	
Securing						
Tamper Indicating Label	Tamper indicating stocks designed to provide a "void" message in the facestock when removal is attempted.	VOID Tamper Indicating Polyester with High Holding Adhesive 350	7381/7866	3.0	Gloss white	
			7380	3.0	Matte white	
		Tamper indicating material designed to provide triangle pattern when removal is attempted.	VOID Tamper Indicating Polyester with Tackified Adhesive P1410	FMV22	2.9	Gloss white
	FMV02			2.9	Bright silver	
	Tamper evident material destructs if attempts are made to remove from substrate. Thermal transfer printable.		Triangle Tamper Indicating Polyester with Tackified Adhesive P1410	FMV01202	2.9	Bright silver
				FMV01402	2.9	Gloss white
	Tamper evident material destructs if attempts are made to remove from substrate. Thermal transfer printable.	Destructible Vinyl with High Holding Adhesive 350	7613	2.8	Matte white	
7885			3.0	Matte white		
Tamper evident material destructs if attempts are made to remove from substrate. Dot matrix printable.	Destructible Vinyl with High Holding Adhesive 200					
Protecting						
Masking	Ultra clear, printable label material for lens protection applications. Low tack adhesive with clean removability.	Highly Transparent Polyester with Removable Adhesive	76991	2.0	Ultra clear	
	High tack adhesive with ultra clean removal.	Thermal Transfer Polyester with Ultra Removable Adhesive R3500	FM1542	2.8	Gloss clear	
		Press Printable Polypropylene with Ultra Removable Adhesive R3500	FP0862	2.8	Clear	
Overlaminates	Protects surface of label from abrasion, sunlight, chemicals, or moisture. Film liner offers excellent graphic appearance.	Non-topcoated Polyester with High Performance Adhesive P1400	OFM010N	1.8	Gloss clear	
		Thermal Transfer Polyester with High Tack Adhesive 400	7744FL	2.1	Matte clear	
		Non-topcoated Polyester with High Tack Adhesive 400	7730FL	1.8	Gloss clear	



## 3M™ Damping Polymers

3M™ Viscoelastic Damping Polymers have been proven to reduce vibration and shock problems in electronics, appliances, automobiles and aircraft. These versatile materials can be adapted to a wide variety of applications, including cover constrained layer dampers; multi-layer laminates using metal or polymeric films; free layer dampers; suspension dampers; isolators; panel, pipe and wing dampers; and more.

### Market Application Areas

- Automotive, including body panels and under the hood
- Aerospace, including spacecraft and commercial aircraft
- Electronics, including speakers and touch pads
- Sporting goods, including golf clubs and tennis racquets
- Appliances, including washing machines

Product	Thickness mils	Liner	Adhesion to Stainless Steel oz./in. (N/100mm) <sup>1</sup>	Typical Performance Characteristics
110P02	2	Paper	88 (96)	<ul style="list-style-type: none"> <li>• Good damping performance at higher temperature: 104-221°F (40-105°C)</li> <li>• Heat and pressure needed for bonding</li> </ul>
110P05	5	Paper	38 (42)	
112P02	2	Paper	100 (109)	<ul style="list-style-type: none"> <li>• Good damping performance at 32-142°F (0-65°C)</li> <li>• Pressure only for adequate bonding at room temperature (70°F/21°C) for many applications</li> </ul>
112P05	5	Paper	144 (158)	

### Market Application Areas

- Choice of enhanced acrylic polymer for improved vibration damping
- Choice of good to excellent thermal stability for long term applications at moderate temperatures, or short term high temperature exposure
- Damping in temperatures ranging from as low as 32°F (0°C) to as high as 221°F (105°C)
- Select Loss Factor and Storage Modulus values to meet requirements

### Processing Versatility

- Select a polymer to bond with pressure only, or with heat and pressure
- Choice of liners to meet different handling requirements
- Wide range of thicknesses to meet design requirements
- Use with a variety of substrates
- Capable of laminating layers to create thicker products
- High or low initial tack, depending on precision of placement

## 3M™ Ultra-Pure Damping Polymers

3M understands that small vibrations in disc drive operations can lead to reduced drive performance and eventually to breakdown. 3M™ Ultra Pure Viscoelastic Damping Polymers are low outgassing adhesives that reduce chemical contamination and corrosive ions that can enter critical damping area environments.

Product	Adhesion to Steel oz./in. (N/100mm)	Temperature Range °F (°C)
ASTM Test Method	D-3330	
242F01	70 (77)	32-150 (0-65)
242F02	80 (88)	32-150 (0-65)
242NR01	35 (38)	32-150 (0-65)
242NR02	100 (109)	32-150 (0-65)

These products have an Adhesive Transfer Tape backing/adhesive structure.

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



Damping polymers for voice coil motors

## 3M™ Ultra Clean, Very Low Outgassing Tapes

3M pioneered the development of silicone free, very low outgassing and low ionics pressure sensitive adhesive and liner technology. That market leadership continues today, with continuous additions to this product family of single-sided, double-sided and free standing adhesive transfer tapes, labels and damping polymers – each offering multiple choices of silicone free liners. These products build on established market leading outgassing performance by enhancing specific chemical attributes which demanding customers have identified.

- Silicone free adhesive and liner combinations – low outgassing and low potential for corrosion, odor and fogging
- Variety of adhesive choices: temporary; permanent but still removable; and permanent
- Various release levels of silicone free liners
- Ultra-pure damping polymers available in die cut shapes

Refer to technical data sheets to get outgassing data for the specific product you need.

Product	Tape Structure (Backing/Adhesive)	Backing Thickness mils	Total Thickness mils	Adhesion to Steel oz./in. (N/100mm)	Tensile Strength lbs/in. (N/100 mm)	Elongation at Break %	Comments
ASTM Test Method		D-3652	D-3652	D-3330	D-3759	D-3759	

### 3M™ Single-Sided Tapes

Very Low Outgassing 6670	Polyester/Hydrocarbon	1.5	1.7	2.6 (2.8)	46.1 (807.7)	192	Low tack process aid. Temp range up to 248°F (120°C)
Very Low Outgassing 6692	Polyester/Acrylic	1.9	2.9	18 (19.8)	52 (TBD)	120	Non-silicone film liner
Polyester 8333	Polyester/Acrylic	0.9	1.8	31 (34.1)	27 (TBD)	120	General purpose
Very Low Outgassing High Shear Polyester 8439FL	Polyester/Acrylic	0.9	1.8	29 (31.9)	29 (TBD)	120	Lined, high shear

Product	Tape Structure	Carrier Thickness mils	Total Thickness mils	Adhesion to Steel oz./in. (N/100mm) <sup>1</sup>	Tensile Strength lbs/in. (N/100 mm)	Elongation at Break %	Comments
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### 3M™ Double-Sided Tapes

55334	Adhesive/PET Carrier/Adhesive	1	3	Removable side: 46 (50) Permanent side: 59 (65)	20.2 (354)	120	Removable adhesive on one side and permanent adhesive on the other side.
55106	Adhesive/PET Carrier/Adhesive	1	3	56 (61)	20.8 (364)	125	Permanent adhesive on both sides.

Product	Adhesives Type	Thickness mils	Liner	Core	Adhesion oz./in. (1/2 in.)	Static Shear RT 1,000 g	Total Outgas* µg/cm <sup>2</sup>	Total Ionics** µg/cm <sup>2</sup>
<b>3M™ Ultra-Clean Laminating Adhesives</b>								
501FL	Acrylic/Permanent	1	FL	Plastic	72	>10,000 min	0.3~1.5	<0.15
502FL	Acrylic/Permanent	2	FL	Plastic	105	>10,000 min	0.5~2.5	<0.15
504FL	Acrylic/Permanent	4	FL	Plastic	132	>10,000 min	2.0~8.0	<0.15

Note: In the product codes, FL denotes 2 mil PET. DS low extractable silicone liner. NR denotes non-silicone liners on both sides - 2 mil PET, 4 mil polyethylene

\* Modified ASTM 4626 - Hydrocarbons, organic acids, esters, alcohols, phenols, acrylates, acetates, etc.

\*\* Typical total ionics by ion chromatograph - chloride, nitrate, sulfate



## Warranty and Security Tapes

### 3M™ Water Contact Indicator Tapes

3M™ Water Contact Indicator Tapes provide a fast, accurate and easy way to positively detect water intrusion into sensitive electronic devices. This family of products offers excellent temperature and humidity resistance, while quickly turning bright red on contact with liquid water. The red color change is irreversible after drying. 3M Water Contact Indicator Tapes are long lasting, and have shown exceptional resistance to wash-out and bleach-out from strong oxidizers.

#### Water Contact Product Selection Matrix

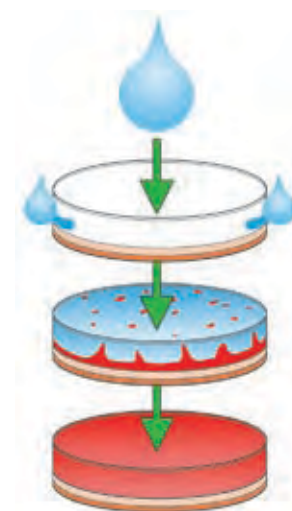
Product	5557	5557NP	5558	5559	5559i
Caliper	10.2 mils	8.6 mils	6 mils	5 mils	5 mils
Film Overlam	Yes	No	Yes	No	No
Thermal Transfer Printable	Yes	Fair	Yes	Fair	No
Other Print Techniques	Yes	Yes	Yes	Yes	No
Indication Speed	Good	Best	Good	Best	Best
Humidity Resistance	Best	Better	Better	Good	Good
Liner Type	2 mil Film	2 mil Film	2 mil Film	2 mil Film	2 mil Film
UL-969	Yes	No	No	No	No
Max. Width (Inches)	12	12	12	12	12
Length (Yards)	180	180	180	180	180

**3M™ Water Contact Indicator Tape 5557** is the workhorse of this product family, and offers a comprehensive package of environmental stability, indication speed, total caliper and printability.

**3M™ Ultrathin Water Contact Indicator Tapes 5558 and 5559** offer a thinner total caliper, where tight geometries dictate a very low thickness water indicator product.

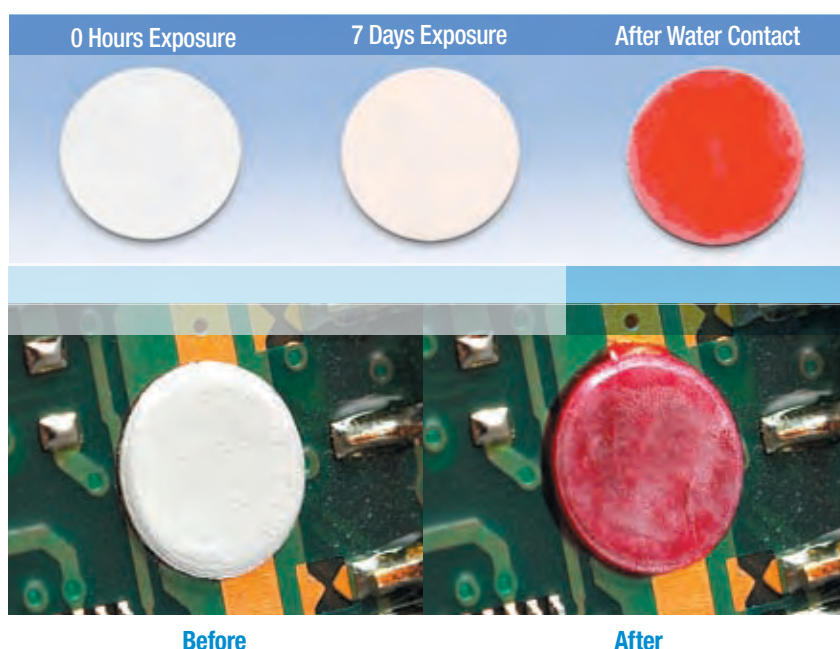
**3M™ Water Contact Indicator Tape 5557NP** is a new addition to this family. The product retains most of the premium attributes of 5557 indicator tape, while offering enhanced indication speed through removal of the top film layer.

**3M™ Water Contact Indicator Tape 5559i** has the same attributes as tape 5559 except the adhesive is on the top side for viewing through transparent substrates, which may be used in certain product designs.



When liquid water contacts the tape edge, the absorbent indicator layer quickly changes from white to red. Not affected by heat and humidity.

Indicator layer and polyester liner combine for easy and accurate die-cutting, including high efficiency rotary.



## 3M™ Cleanroom Tapes

3M™ Cleanroom Tape Products are specifically prepared and packaged for direct introduction and application into cleanroom manufacturing facilities. Their plastic cores and double polyethylene bag packaging eliminate contamination from dirty cardboard and paper products.

**3M™ Cleanroom Tape 1251** is a general purpose vinyl tape, used for applications including color coding, sealing, floor marking and isolation of maintenance activities. Available in one transparent and two color tape variations.

**3M™ Cleanroom Tape 1254** offers a very high tack formulation, suitable for creating temporary barriers during cleanroom construction or maintenance.

Product	Tape Structure (Backing/ Adhesive)	Backing Thickness mils (mm)	Total Thickness mils (mm)	Adhesion to Steel oz./in. (N/100mm)	Tensile Strength lbs/in. (N/100 mm)	Elongation at Break %	Temperature Range °F (°C)	Comments
ASTM Test Method		D-3652	D-3652	D-3330	D-3759	D-3759	D-3759	
1251 White/Yellow/Transparent	Vinyl/Rubber	4.1 (0.10)	5.2 (0.13)	23 (25)	16 (280)	130	40–170 (4–77)	General purpose. Clean room.
1254/Transparent	Polyester/ Rubber	1.4 (0.04)	4.1 (0.10)	145 (160)	25 (440)	18	40–200 (4–93)	Very high tack. Clean room.
1258/Amber	Polyimide/ Silicone	1.0 (0.03)	2.7 (0.07)	20 (22)	33 (578)	60	-100–500 (-73–260)	High temperature Low static.
3305/Transparent	Polyester/ Rubber	1.6 (0.04)	2.7 (0.07)	120 (131)	43 (753)	180	40–200 (4–93)	Very high tack. De-taping applications.

Product	Backing	Adhesive	Breaking Strength oz./in. (N/cm)	Features	Remove from Roll volts	Adhesion to Steel oz./in. (N/cm)	Remove from Stainless Steel volts
40	Polyester Film	Antistatic Polymer Conductive	20 (35)	General use utility tape for electronic components and assemblies. Antistatic conductive polymer adhesive. Clear.	5	15 (1.7)	5
40PR	Polyester Film	Antistatic Polymer Conductive	20 (35)	General use utility tape for electronic components and assemblies. Antistatic conductive polymer adhesive. Clear, printed with antistatic symbol.	5	15 (1.7)	5





## 3M™ VHB™ Tapes

3M™ VHB™ Tapes provide the convenience and simplicity of a tape fastener and are ideal for use in many interior and exterior bonding applications. In many situations, they can replace rivets, spot welds, liquid adhesives and other permanent fasteners. These 3M™ VHB™ Tapes are made with acrylic foam which is viscoelastic in nature. This gives the foam energy absorbing and stress relaxing properties which provides these tapes with their unique characteristics. The acrylic chemistry provides outstanding durability and performance.

- Bond with high holding strength for static and dynamic strength
- Provide a continuous bond to distribute stress over entire area
- Holds up to high temperature, cold, temperature cycling, UV light, moisture and solvents
- Damp vibration
- Seal against environmental conditions
- Join dissimilar materials
- Separates metals to reduce potential for galvanic corrosion

Product Number	Tape Thickness w/o liner mils (mm)	Description	Adhesive Type	Temperature Resistance		Solvent Resistance	Relative Adhesion		Application Ideas
				Minutes Hours °F (C)	Days Weeks		HSE	LSE	
3M™ VHB™ Conformable Foam Tapes									
4941	45 (1.1)	<ul style="list-style-type: none"><li>• Gray closed-cell acrylic foam carrier</li><li>• Conformable</li><li>• Good adhesion to many painted metals</li></ul>	Multi-Purpose Acrylic	300°F (149°C)	200°F (93°C)	High	High	Med	<ul style="list-style-type: none"><li>• Bonds muntin bars to windows</li><li>• Bond and seal polycarbonate lens over LCD</li><li>• Bond pre-painted metals in truck assembly</li><li>• Bond and seal plastic windows to pre-painted control panels/switch gear</li><li>• Mount vinyl wiring ducts and conduit channels</li></ul>
5925	25 (0.64)	<ul style="list-style-type: none"><li>• Black, closed-cell acrylic foam carrier</li><li>• Very conformable</li><li>• Good adhesion to many painted surfaces, including powder coated paint</li><li>• UL 746C</li></ul>	Modified Acrylic	300°F (149°C)	250°F (121°C)	High	High	Med	<ul style="list-style-type: none"><li>• Bonds to a variety of plastics and paint systems</li></ul>
5952	45 (1.1)	<ul style="list-style-type: none"><li>• Black, closed-cell acrylic foam carrier</li><li>• Conformable</li><li>• Good adhesion to many painted surfaces, including powder coated paint</li><li>• Meets UL V2 performance requirements</li></ul>							
5958FR	45 (1.1)	<ul style="list-style-type: none"><li>• Black, closed-cell acrylic foam carrier</li><li>• Conformable</li><li>• Good adhesion to many painted surfaces, including powder coated paint</li><li>• Meets UL V2 performance requirements</li></ul>							

<b>3M™ VHB™ Conformable Foam Tapes</b>									
4611	45 (1.1)	<ul style="list-style-type: none"> <li>• Dark gray, closed-cell acrylic foam carrier</li> <li>• High temperature resistance</li> <li>• UL 746C</li> </ul>	General Purpose Acrylic	300°F (149°C)	200°F (93°C)	High	High	Med	<ul style="list-style-type: none"> <li>• Pre-powder coat paint applications: hat channels and stiffeners</li> <li>• Attach stiffeners in air conditioners, office furniture and telecommunications equipment</li> </ul>
4950	45 (1.1)	<ul style="list-style-type: none"> <li>• White, closed-cell acrylic foam carrier</li> <li>• All purpose adhesive</li> <li>• UL 746C</li> </ul>	Modified Acrylic	300°F (149°C)	250°F (121°C)	High	High	Med	<ul style="list-style-type: none"> <li>• Bond aluminum skin to steel support of trucks, vans and ambulances</li> <li>• Bond architectural signs to frames</li> </ul>

<b>3M™ Adhesive Transfer Tapes</b>									
F9460 PC	2.0 (0.05)	<ul style="list-style-type: none"> <li>• Clear adhesive transfer tape</li> <li>• High shear strength adhesive</li> <li>• UL 746C</li> </ul>	100MP	500°F (260°C)	300°F (149°C)	High	High	Low	<ul style="list-style-type: none"> <li>• Bond decorative metal trim</li> <li>• Bond flexible circuits to aluminum rigidizers or heat sinks</li> </ul>
F9469 PC	5.0 (0.13)	<ul style="list-style-type: none"> <li>• Clear adhesive transfer tape</li> <li>• High shear strength adhesive</li> <li>• UL 746C</li> </ul>							

Virtually invisible fastening helps keep surface smooth and clean to enhance design and appearance.



Die cut to precisely fit any shape, size or profile.

Thin VHB Foam Tapes provide excellent shock and vibration resistance without the cure times of silicone.



## 3M™ Light Cure Adhesives

3M™ Light Cure Adhesives offer an advanced new approach to bonding. Their superior depth of cure, rapid cure speed and easy dispensability can save valuable processing time in both UV and visible light curing assembly environments.

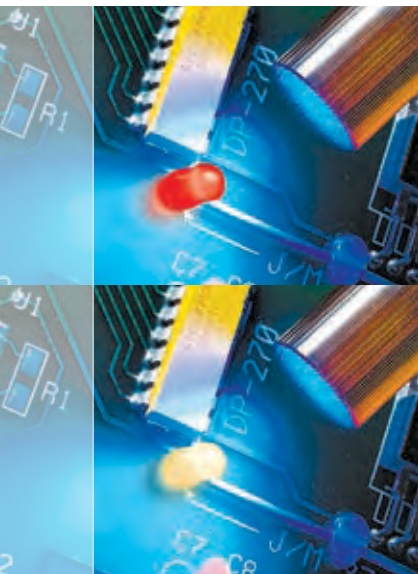
Light Cure Adhesives are ideally suited for demanding designs and sophisticated components – offering strong and durable adhesion in both indoor and outdoor applications plus clean, thin bond lines for improved aesthetics. And 3M's technical know-how and support can be a critical resource in bringing your products to market faster.



Formulations available in 30mL and liter EFD®-compatible syringes for precision application

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

**BEFORE**  
Red color of LC-1214 provides visualization aid for positioning.



Features	Advantages	Typical Applications
<ul style="list-style-type: none"> <li>Reduced processing time</li> <li>Clean, thin bond lines</li> <li>Superior depth of cure</li> <li>Cure-on-demand performance</li> <li>Cure when exposed to UV or visible light</li> <li>Resistant to corrosion</li> <li>Compatible with manual, semi-automatic or fully automatic dispensing systems</li> </ul>	<p><b>UV Curing</b></p> <ul style="list-style-type: none"> <li>Fast curing – under 1 second</li> <li>Ideal for thin films, thin coatings and bonding applications on heat-sensitive substrates</li> <li>Provides long pot life</li> <li>No special storage required</li> </ul> <p><b>Visible Light Curing</b></p> <ul style="list-style-type: none"> <li>Ideal for curing through thicker sections</li> <li>Cures through colored or UV-absorbing materials</li> <li>Poses fewer safety risks to eyes and skin</li> <li>Lower energy consumption and maintenance costs</li> </ul>	<ul style="list-style-type: none"> <li>Electronics assembly</li> <li>Eyewear</li> <li>Traffic lighting</li> <li>Vehicle signal and emergency lights</li> <li>Needles and syringes</li> <li>Appliances</li> <li>Indoor and outdoor lighting reflectors and housings</li> </ul> <p>...plus thousands of other uses!</p>

	Product	LC-1112	LC-1113	LC-1211	LC-1212	LC-1213	LC-1214	LC-1215
	Cure Mechanism	UV	UV	Visible, UV	Visible, UV	Visible, UV	Visible, UV	Visible/UV
	Cure Speed, UV (sec) <sup>1</sup>	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Cure Speed, Visible (sec) <sup>2</sup>	N/A	N/A	<5	2	2	<5	2
Typical Uncured Properties	Color	Colorless	Colorless	Light Yellow	Light Yellow	Light Yellow	Red	Light Yellow
	Viscosity @72°F (cP) <sup>3</sup>	15,460	641	488	12,720	560	44,000	300
Typical Cured Properties	Color	Colorless	Colorless	Light Yellow	Light Yellow	Light Yellow	Yellow	Light Yellow
	Shore D Hardness <sup>4</sup>	83	71	69	83	69	40	31
	Overlap Shear Strength, PC-PC (psi) <sup>5</sup>	411	522	436	455	566	540	735
	Comments	Semi-rigid bond. Passes 3M corrosion test on copper and aluminum. <sup>6</sup>	Flexible bond. Improved glass and metal adhesion. Passes 3M corrosion test on copper and aluminum. <sup>6</sup>	Flexible bond. Passes 3M corrosion test on copper and aluminum. <sup>6</sup>	Semi-rigid bond. Improved glass and metal adhesion.	Flexible bond. Improved glass and metal adhesion.	Very flexible bond. Color change indicator (red to light yellow).	Low viscosity. Flexible bond.

NA = Not Applicable

<sup>1</sup>EFOS Ultracure 100ss Plus, 5 mil thickness

<sup>2</sup>3M™ Curing Light VL1, 5 mil thickness

<sup>3</sup>Brookfield DV-1+, ASTM D 1084

<sup>4</sup>ASTM D 2240

<sup>5</sup>ASTM D1002

<sup>6</sup>3M corrosion test (non-bias): adhesive coated on metal-sputtered PET film, cured, stored at 85°C/85% R.H. for two weeks, inspected for corrosion.

### AFTER

By changing from red to light yellow, LC-1214 indicates full cure.

For fine bondline, low slump, low color applications please contact your 3M representative and ask for the UV/Visible light curable LC-1114. In addition, your 3M representative is also available to assist you with requests for other custom light cure applications.

# 3M™ Plastic Bonding Adhesive

## For thin bond line of small joints in lens/case assembly and more

3M™ Plastic Bonding Adhesives are moisture curing urethanes that apply warm and sets like a hot melt adhesive, but with a long open time for easy assembly of parts requiring a thin bond line. These materials are available in 30cc syringes and 295 ml cartridges.

## Lower overall assembly with improved efficiency, productivity, and yield

- High tack holds parts together for immediate handling and fast production
- 4-minute open time allows initial repositioning even with thin bond lines that would otherwise cure too quickly for assembly
- High viscosity holds bead shape and size in small, defined areas
- One-component formulation eliminates potential inconsistencies of metering and mixing
- 100% solids provides a low-VOC system with no drying equipment and no attack on plastics
- Bonds and seals simultaneously

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

## High performance for lens/case and housing assembly in cell phones and notebooks, MP3 players, portable batteries, and other consumer electronics

- Thin, tough and flexible bond lines help improve fit, appearance, and reliability
- High strength bonds plastics and metals, dissimilar substrates, and even hard-to-bond plastics such as polycarbonate
- Improved appearance without the whitening from cyanoacrylate and cracking from ultrasonic welding

High tack beads with long open time for thin bond lines

Characteristic	3M™ Plastic Bonding Adhesive 2665, 2667, 2669	Ultrasonic Welding	3M™ Cyanoacrylate Adhesive
Production speed	Fast with very high tack yet long open time for assembly	Very fast	Bonds on contact
Bond thin plastic joints	Bond lines less than 1mm wide	Difficult; potential vibration damage	May flow beyond bond area
Bond dissimilar plastics/materials	Hard-to-bond plastics can be bonded after simply wiping off	Attach only similar materials	Bonds dissimilar plastics/materials
Bond strength	Very strong even in small areas; flexible to withstand impact	Very strong	Very strong but brittle and can crack
Appearance	Virtually invisible; no blooming	Can scratch and crack plastics	Causes blooming
Complete seal	Complete	Incomplete	Complete

## Typical Uncured Properties

Characteristic	3M™ Plastic Bonding Adhesive 2665	3M™ Plastic Bonding Adhesive 2667	3M™ Plastic Bonding Adhesive 2669
Application Temperature	230°F (110°C)	230°F (110°C)	230°F (110°C)
Viscosity (@230°F/110°C)	11,000 cps	6,750 cps	11,700 cps
Color (solid)	White/Off-white	White/Off-white	White/Off-white
Set Time	2-4 minutes	1.5 minutes	4 minutes

## Overlap Shear Strength (psi), Tested @ 73°F (23°C), Thermal Shock (TS)\* and Temperature/Humidity (TH)\*\*

Substrate	OLSS (PSI)		
	73°F (23°C)	After TS	After TH
Polycarbonate	940	1,115	945
ABS	690	565	795
Acrylic	830	715	715
Stainless Steel	465	590	490
PVC	560	NT	NT

\*Condition for TS: -40° to 85°C, 30 minute dwell for 20 cycles

\*\*Condition for TH: 68°C/95% RH for 3 days

NT: Not tested





## 3M™ Epoxy and Hot Melt Adhesives

### 3M™ Scotch-Weld™ Electronic Grade Epoxy

For assembly of sophisticated electronics where outgassing and corrosion of material bonds are a concern, our two-part 3M™ Scotch-Weld™ Electronic Grade (EG) Epoxies are an excellent alternative to mechanical fasteners and lower-grade adhesives. Scotch-Weld EG Epoxies produce far lower contamination levels of ionic and outgassing impurities than typical epoxy adhesives. This makes Scotch-Weld EG Epoxies ideal for the fabrication and assembly of critical components.

Product	Viscosity cps	Mixed Work Life @ 74°F (23°C)	Shear Strength Aluminum PSI	Average T-Peel at 75°F (24°C) piw
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3M™ Scotch-Weld™ Electronic Grade Epoxy				
DP-100	B-12,000 A-14,000 @ 74°F (23°C)	3- 5 min	1500	2
DP-100 Plus Clear	B-7,000 A-10,000 @ 77°F (25°C)	3- 4 min	3500	13
DP-125	B-4,000 A-6,000 @ 77°F (25°C)	18-28 min	2500*	35*
DP-190 Gray	B-100,000 A-60,000 @ 80°F (27°C)	90 min	2200*	20*
DP-270 Clear/Black	B-22,000 A-18,000 @ 74°F (23°C)	60-70 min	2400	2
DP-420	B-35,000 A-10,000 @ 74°F (23°C)	20 min	4400	49
DP-460	B-35,000 A-10,000 @ 74°F (23°C)	60 min	4600	50
DP-460 EG	B-35,000 A-10,000 @ 74°F (23°C)	60 min	4600	50
DP-4XL EG	B-35,000 A-10,000 @ 74°F (23°C)	5-6 hr	4500	45

3M™ Scotch-Weld™ Structural Acrylic Adhesive				
DP-810	B-18,000-22,000 A-18,000-22,000 @ 74°F (23°C)	8-10 min	4200	30
DP-810 Black	B-18,000-22,000 A-18,000-22,000 @ 74°F (23°C)	8-10 min	4200	30

3M™ Scotch-Weld™ Structural Plastic Adhesive				
DP-8005	—	—	2075CF**	N/A
DP-8010	—	—	2200CF**	N/A

3M™ Scotch-Weld™ Hot Melt Adhesive					
3748 Off-white	5000 @ 374°F (190°C)	N/A	200	FR-4	40 FR-4
3748 VO Light Yellow	5500 @ 374°F (190°C)	N/A	220	FR-4	35 FR-4

\* RT cure with 160°F (71°C), 2 hour post cure.

\*\* CF=cohesive failure



3M offers dispensing systems to meet the most exacting fabrication and assembly applications.

## Abrasives for Electronics Finishing

Eliminate defects and achieve the precision finish your operation demands with advanced abrasive products from 3M. These advanced, cost-effective abrasives bring superior consistency to lapping and polishing fiber optics, wafer substrates, memory disks, and other photonic and electronic components.

### 3M™ Diamond Lapping Films

A cleaner, more consistent alternative to diamond compounds and slurries. 3M™ Diamond Lapping Films can reduce polishing time, achieve superior flatness and edge finish, and eliminate slurry disposal problems.

#### Key Features and Benefits

- Faster cut
- Increased throughput
- Flatter surface, no rounding
- Better finish, no chipping
- Long abrasive life minimizes disc changes

#### Applications

- Polishing fiber optic connectors and rigid memory discs
- Texturing thin film discs
- Roll superfinishing
- Flat lapping applications

Product	Backing Type	Backing Thickness mils (mm)	Bonding Resins	Suggested Applications
631X	Plain Back	1.0	Standard Resin	Magnetic Head Lapping
641X	Plain Back	1.5	Standard Resin	
651X	Plain Back	2.0	Standard Resin	Semi Bevel Edge Blending
660XV	Plain Back	3.0	Precision Coated Type H	Fiber Optics, Flat Lapping, Medical, Military
661X/668X	Plain Back/PSA	3.0	Standard Resin	
661XU	Plain Back/PSA	3.0	Precision Coated	
662XW/666XW	Plain Back/PSA	3.0	Type H, Tough resin system with higher diamond content	HDD Sliders
663X/664X	Plain Back/PSA	3.0	Type P, Hard Resin	

Available in discs, rolls and sheets.

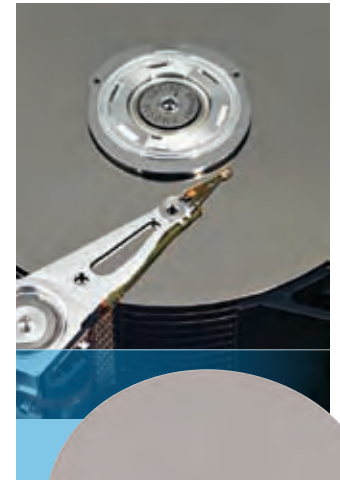
### 3M™ Trizact™ Diamond Lapping Film

Helps reduce finishing times with our innovative microreplicated structured abrasives. As these film-backed abrasives are used, fresh minerals are continuously exposed, ensuring a fast and extremely consistent cut rate through the long life of the abrasive.

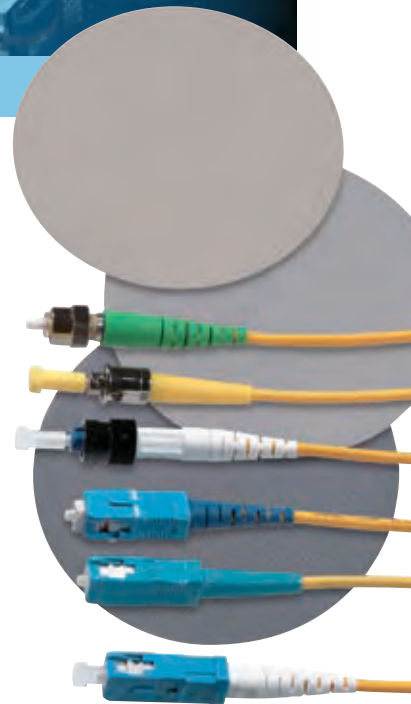
- Faster cut
- Increased throughput
- Flatter surface, no rounding
- Better finish, no chipping
- Longest abrasive life
- Flat cut curve

Product	Backing Type	Backing Thickness mils (mm)	Bonding Resins	Mineral	Suggested Applications
661XA	Plain Back/PSA	3.0	Microreplication Technology	Diamond	Fiber Optics

Available in roll, sheet and disc form. Maximum diameter and width is 10".



Abrasives



# Abrasives for Electronics Finishing

## 3M™ Lapping Films

3M™ Lapping Films have precisely graded mineral coated on a high strength polyester backing to provide a uniform, consistent finish. These high-quality films provide a precision finish every time.

### Key Features and Benefits

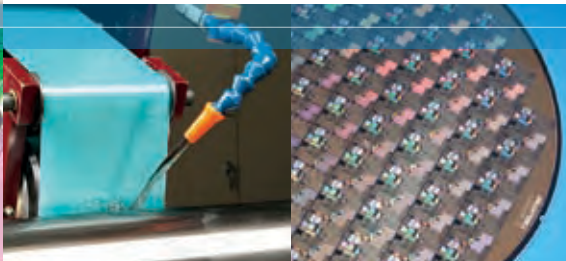
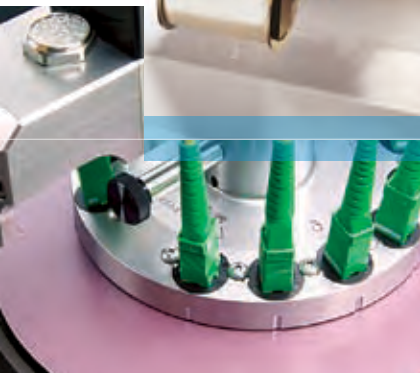
- Uniform coating
- Tight mineral particle distribution
- Full line offering
- PSA/non-PSA offered

### Applications

- Polishing fiber optic connectors and rigid memory discs
- Texturing thin film discs
- Roll superfinishing
- Flat lapping applications
- Fiber bundles for medical

Product	Backing Type	Backing Thickness mils (mm)	Mineral Types	Bonding Resins	Suggested Applications
061X	Polyester	3	Chromium Oxide (Cro)	Standard	
254X	Plain	2	Aluminum Oxide (AlO)	Standard	Fiber Optics Fine/Super Finishing Coarse
261X	Plain	3	Aluminum Oxide (AlO)	Standard	
262X	Plain	3	Aluminum Oxide (AlO)	Softer resin	Electronic Head Finishing
263X	Plain	3	Aluminum Oxide (AlO)	Type P, Hard resin	Super Finishing/Fiber Optics
265X	PSA	3	Aluminum Oxide (AlO)	Standard	Flat Lapping
266X	PSA	3		Type P, Hard resin	
268X	PSA	3	Aluminum Oxide (AlO)	Standard	Fiber Optics
452X	Plain	2	Silicon Carbide (SiC)	Type F-2	Floppy Disc Burnishing
461X	Plain	3	Silicon Carbide (SiC)	Standard	Fiber Optic Connectors
462X	Plain	3		Harder resin	
463X	Plain	3	Silicon Carbide (SiC)	Easy breakdown resin for MT connector polishing	Fiber Optic MT Multifiber Connectors
464X	Plain	3	Silicon Carbide (SiC)	Type P, Hard resin	Fiber Optic Connectors
466X	PSA	3		Type P, Hard resin	
468X	PSA	3		Standard	
468XW	PSA	3		Easy breakdown resin for MT connector polishing	Fiber Optic MT Multifiber Connectors
468XY	PSA	3		Harder resin	Fiber Optic Connectors Bare Glass Fibers
562X	Polyester	3	Cerium Oxide (CeO)	Standard	
863X	Polyester Film	3	Silica (SiO)	Standard	Fiber Optic Final Polish Flat Lapping
863XW	Polyester Film	3		Standard	
865X	Polyester	3		Standard	
869X	PSA	3		Standard	
869XW	PSA	3		Standard	

Available in discs, rolls and sheets.





# Abrasives for Electronics Finishing

## 3M™ Polishing Films

- Micron-graded particles, resin bonded to a polyester backing
- Better control of fiber protrusions
- Improved throughput
- Fewer rejects
- Elimination of slurry cleanup
- Reduced equipment maintenance costs

Product (plain back)	Product (PSA backing)	Mineral	Suggested Applications
591X	598X	Cerium Oxide	MT Connectors Plastic Polishing Metal Polishing Cleaning Parts Glass Polishing
291X	298X	Aluminum Oxide	
491X	498X	Silicon Carbide	
951M	9058M	None	
961M	968M	None	

Available in roll, sheet and disc form.

## 3M™ Wetordry™ Polishing Paper

Comprised of micron graded particles, slurry coated onto a non-woven synthetic backing. The superior flexibility of this product allows for fast and easy finishing and polishing, even on highly contoured surfaces.

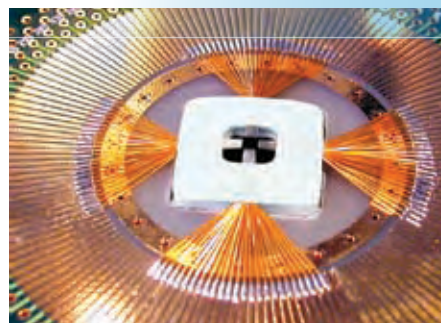
- Use wet or dry
- Precision micron grading for a uniform, consistent finish
- Shortens hand-sanding and buffing time
- Reduces finishing steps and saves time
- Color-coded micron grading for easy selection
- Pressure Sensitive Adhesive (PSA) and 3M™ Hookit™ Attachment Systems backing available
- Plastic, glass and metal finishing

Product	Backing	Mineral	Color/Grade					
			Lt. Green 1 μ	Mint 2 μ	Pink 3 μ	Blue 9 μ	Grey 15 μ	Green 30 μ
281Q	Regular	Aluminum Oxide	X	X	X	X		
286Q	PSA	Aluminum Oxide	X	X	X	X		
286Q	Hookit Attachment Systems	Aluminum Oxide			X	X		
481Q	Regular	Silicon Carbide					X	X
486Q	PSA	Silicon Carbide					X	X
486Q	Hookit Attachment Systems	Silicon Carbide					X	X

Available in roll, sheet and disc form.

Can also be used to repair:

- CDs/DVDs
- Windshields
- Jewelry
- Acrylic parts
- Probe card cleaning



## 3M™ Novec™ Aerosol Cleaners

3M™ Novec™ Aerosol Cleaners give you a new way to meet today's electronics and precision cleaning challenges – combining fast, effective cleaning performance with a wide margin of safety for workers and a favorable environmental profile. They offer an excellent alternative to HCFC 141b-based cleaners.

### Features of 3M's proprietary Novec Aerosol Cleaner technology

- Non-flammable
- Low toxicity
- Non-ozone depleting
- Non-corrosive
- Fast drying, no residue.
- Contain no HCFCs, HFCs, nPB or HAPs

### Novec Aerosol Cleaners offer great value

Based on high performance proprietary 3M formulations, Novec Aerosol Cleaners contain more active solvent, resulting in more cleanings per ounce than many competitive cleaners.

### Novec Aerosol Cleaners Selection Guide

	Novec Contact Cleaner	Novec Contact Cleaner Plus	Novec Electronic Degreaser	Novec Flux Remover
<b>Cleaning strength</b>	Light Duty	Medium Duty	Heavy Duty	Heavy Duty
<b>Plastic compatibility</b>	Plastic-safe	Plastic-safe	May damage ABS, PS, acrylic and polycarbonate	May damage ABS, PS, acrylic and polycarbonate
<b>Cleaning Performance</b>				
Particulate	+++	+++	+++	+++
Krytox®	+++	+++	++	++
Light oils	•	++	+++	+++
Heavy oils and greases	—	—	++ or +++	++ or +++
Hydraulic fluid	•	++	+++	+++
Rosin-based flux	—	—	++	+++
No-clean flux	—	—	++	++
Lead-free flux	—	—	++	+++

**Rating Key:** +++ Excellent ++ Very Good • Moderate — Not Recommended

RoHS/WEEE compliant	Yes	Yes	Yes	Yes
Meets CA VOC limits	No	Yes	Yes	Yes
Meets OTC VOC limits	Yes	Yes	Yes	Yes
NSF Registration	K2 137246	Not registered	K2 137245	K2 137247
NSN	6850-01-534-2919	NA	6850-01-534-2927	6850-01-534-2943



# 3M™ Novec™ Aerosol Cleaners

## 3M™ Novec™ Contact Cleaner

- Non-flammable, low toxicity
- Ideal for electrical or energized equipment and components
- Excellent for cleaning fiber optic connectors
- Effectively removes fluorinated oils and greases, light oils and silicones, dust and particulates from sensitive electrical and electronic equipment.
- Excellent plastics compatibility

### Environmental, Health and Safety Information

Properties	Novec Contact Cleaner	HCFC-141b
Ozone Depletion Potential - ODP <sup>1</sup>	0.00	0.10
Global Warming Potential - GWP <sup>2</sup>	297	725
Atmospheric Lifetime - ALT (years)	3.8	9.3
Flashpoint	None	None
Flammability Range in Air	None	7.6 - 17.7 <sup>3</sup>
Exposure Guideline (ppmV, 8 hr time weighted average)	750	500

<sup>1</sup>CFC-11 = 1.0    <sup>2</sup>GWP-100 year integration time horizon, CO<sub>2</sub> = 1.0    <sup>3</sup>Vol% by ASTM E681-94 @ 100°C



## 3M™ Novec™ Contact Cleaner Plus

- Fast drying, low odor
- Excellent plastics compatibility
- No rinsing and no residues
- Non-corrosive, non-conductive
- Non-flammable
- Low toxicity
- Low Global Warming Potential
- Formulated with 3M™ Novec™ 7200 Engineered Fluid which, is VOC-exempt under California Air Resources Board (CARB) regulations

### Environmental, Health and Safety Information

Properties	Novec Contact Cleaner	HCFC-141b
Ozone Depletion Potential - ODP <sup>1</sup>	0.00	0.10
Global Warming Potential - GWP <sup>2</sup>	71	725
Atmospheric Lifetime - ALT (years)	3.8	9.3
Flashpoint	None	None
Exposure Guideline (ppmV, 8 hr time weighted average)	200	500

<sup>1</sup>CFC-11 = 1.0    <sup>2</sup>GWP-100 year integration time horizon, CO<sub>2</sub> = 1.0



## 3M™ Novec™ Electronic Degreaser

- Non-flammable, low toxicity
- Effectively removes heavy oils, greases and handling soils from electric, electronic and electrical equipment
- Formulated with Novec 7200 fluid, which is VOC-exempt under California Air Resources Board (CARB) regulations
- Industrial strength cleaner
- Fast drying, no residue
- Non-ozone depleting, low global warming potential
- Test on plastics before using – may damage acrylics, polycarbonates, ABS and PS

### Environmental, Health and Safety Information

Properties	Novec Electronic Degreaser	HCFC-141b	HCFC-225ca	nPB	TCE
Ozone Depletion Potential - ODP <sup>1</sup>	0.00	0.10	0.03	0.013-0.1	0.0
Global Warming Potential - GWP <sup>2</sup>	30	725	122	Low	Low
Hazardous Air Pollutant <sup>3</sup>	No	No	No	No	Yes
Exposure Guidelines (ppmV, TWA)	200	500	50	10	10
Margin of Safety (MOS) <sup>4</sup>	10	25	2.5	0.5	0.5

<sup>1</sup>CFC-11 = 1.0

<sup>2</sup>GWP-100 year integration time horizon, CO<sub>2</sub> = 1.0

<sup>3</sup>As defined by the U.S. EPA in the Clean Air Act of 1990

<sup>4</sup>MOS in use =  $\frac{\text{Exposure Guideline}}{\text{Assumed 20 ppmV 8hr TWA exposure}}$



## 3M™ Novec™ Flux Remover

- Non-flammable, low toxicity
- Effectively removes a wide variety of rosin solder fluxes used in electronics manufacturing and repair – including rosin-based and many no-clean and lead-free fluxes
- Formulated with Novec 7200 fluid which, is VOC-exempt under California Air Resources Board (CARB) regulations
- Non-ozone depleting, low global warming potential
- Test on plastics before using – may damage acrylics, polycarbonates, ABS and PS

### Environmental, Health and Safety Information

Properties	Novec Flux Remover	HCFC-141b	HCFC-225ca	nPB	TCE
Ozone Depletion Potential - ODP <sup>1</sup>	0.00	0.10	0.03	0.013-0.1	0.0
Global Warming Potential - GWP <sup>2</sup>	30	725	122	Low	Low
Hazardous Air Pollutant <sup>3</sup>	No	No	No	No	Yes
Exposure Guidelines (ppmV, TWA)	200	500	50	10	10
Margin of Safety (MOS) <sup>4</sup>	10	25	2.5	0.5	0.5

<sup>1</sup>CFC-11 = 1.0

<sup>2</sup>GWP-100 year integration time horizon, CO<sub>2</sub> = 1.0

<sup>3</sup>As defined by the U.S. EPA in the Clean Air Act of 1990

<sup>4</sup>MOS in use =  $\frac{\text{Exposure Guideline}}{\text{Assumed 20 ppmV 8hr TWA exposure}}$





## Fasteners

### 3M™ Dual Lock™ Reclosable Fasteners

#### A reclosable system to replace unsightly mechanical fasteners.

3M™ Dual Lock™ Reclosable Fasteners invisibly attach access doors and panels, signs, display components, and many other frequently removed parts. When the mushroom-shaped stems interlock, closure strength of the system is high enough to replace mechanical fasteners in many applications.

Yet you can readily open and close Dual Lock Reclosable Fasteners hundreds of times. Depending on your application, select non adhesive-backed or adhesive-backed versions. Adhesive-backed versions bond to bare or painted metal, sealed wood, glass, many plastics including plasticized vinyl, and more. 3M™ Dual Lock™ Reclosable Fasteners Low Profile is thinner than standard Dual Lock Reclosable Fasteners, performs similar to the 250/250 stem combination and is available in clear for color matching or black, for general applications.



Pre-cut 3M™ Dual Lock™ Reclosable Fasteners hold access panels in electronic equipment. Pre-cut shapes are available with pressure sensitive or plain backing. Pop-in stems, slide-in pieces or mechanical attachments provide alternative options.



### 3M™ Scotchmate™ Reclosable Fasteners

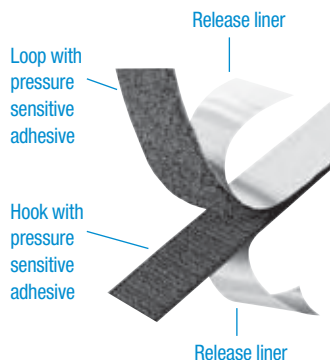
#### Industrial-strength fasteners for easy opening and closing.

When your products require thousands of easy openings and secure closings,

3M™ Scotchmate™ Hook and Loop Reclosable Fasteners give you choices that improve your product and save production time. When closing, tiny, stiff hooks on one side of the fastener mesh with pliable loops on the other. For opening, simply peel one side away.

Choose adhesive-backed or plain-back fasteners. The pressure sensitive adhesives bond on contact to a variety of substrates. Adhesive formulations are designed with a wide range of performance characteristics including: flame resistance, high shear strength, low and high temperature resistance, and plasticizer resistance for use with most vinyls.

Die-cut Scotchmate reclosable fasteners secure metal edge molding around an internally-illuminated sign. The molding holds the sign face in place and is readily removed for bulb replacement.



# Protective Products

## 3M™ Bumpon™ Protective Products, Standard and Custom Shapes

### Take the edge off noise, put an end to scratches.

Wherever slamming, scratching, nicking, scuffing, sliding, vibration or noise could be a problem for your product – or make your product a problem – 3M™ Bumpon™ Protective Products provide a margin of safety. You have a choice of permanently resilient pads, feet, buttons, strips, bumpers or spacers.

- Pressure sensitive adhesives bond fast and permanently when pressed to most clean, dry and smooth surfaces.
- Resilient elastomer will not dry out, rot, or embrittle; cushions and damps noise indefinitely.
- High coefficient of friction resists skidding on most surfaces.
- Contains no corrosive plasticizer or vulcanizing agent to chemically mar surfaces.
- Easy to apply; separate from liner and “bump it on” with no screws, rivets, or application equipment.
- Custom 3M™ Bumpon™ Protective Products expand the possibilities for shape, size, color and applications beyond the standard line. Performance and savings are the same.

For feet on a monitor stand, low profile 3M™ Bumpon™ Protective Products perform more reliably than high-profile, because low profile better withstands the load and shear stress. High profile allows better heat dissipation on electrical or electronic equipment.

### 3M™ Bumpon™ Protective Products

SJ5012 (Black), SJ6112, Resilient Rollstock (Family), Custom (Molded) Products

SJ5744 (Black), SJ6344EZ (Black), Resilient Rollstock (Family) and Custom (Molded) Products

SJ5302/SJ5402 (Clear or Colored), Custom (Molded) Products

Resilient Rollstock (Family)

These are just a few examples of the many Bumpon products available for electronics assembly. Please consult your 3M representative for specific product recommendations and samples to evaluate in your application.

Match the shape size and color to the application with off-the-shelf standards, custom shapes, or die-cuts from roll stock.

Customize with a choice of adhesives for secure adhesion to either low surface energy or high surface energy plastics.



Durable, pressure sensitive acrylic or rubber adhesives go on fast with just finger pressure. Saves time and money with no screw holes, glue mess, or drying time.



When you want a little touch of quiet and skid resistance for a PDA or other small product, custom 3M™ Bumpon™ Protective Products are scaled for the design. Adhesive is formulated to hold even with a smaller bonding surface.

Customized clear cushions made from 3M™ Bumpon™ Protective Product material blend with the laptop's computer base. High coefficient of friction helps keep the computer in place.

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8880-S7	3M™ Transparent EMI Film	5	CEF0807	3M™ Contrast Enhancement Film	13
8805	Thermally Conductive Interface Materials	2, 3	CEF08A05	3M™ Contrast Enhancement Film	13
8810	Thermally Conductive Interface Materials	2, 3	CEF08A07	3M™ Contrast Enhancement Film	13
8815	Thermally Conductive Interface Materials	2, 3	CEF0910	3M™ Contrast Enhancement Film	13
8820	Thermally Conductive Interface Materials	2, 3	CN 3190	Metalized Cloth	9
9082	3M™ Adhesive Transfer Tapes	15	CU-10S	EMI Shielding Sheets and Films	9
9085	3M™ Adhesive Transfer Tapes	15	CU-35C	Copper Foil	8
9453LE	3M™ Adhesive Transfer Tapes	15	CU-1010S	EMI Shielding Sheets and Films	9
9471LE	3M™ Adhesive Transfer Tapes	15	F9460PC	3M™ Adhesive Transfer Tapes	15
9472LE	3M™ Adhesive Transfer Tapes	15	F9469PC	3M™ Adhesive Transfer Tapes	15
9482PC	3M™ Adhesive Transfer Tapes	15	F9473PC	3M™ Adhesive Transfer Tapes	15
9485PC	3M™ Adhesive Transfer Tapes	15	FM1542	Performance Label Materials	18
9490LE	3M™ Double Coated Tapes	16	FM033202	Performance Label Materials	18
9492MP	3M™ Double Coated Tapes	16	FM043702	Performance Label Materials	18
9495LE	3M™ Double Coated Tapes	16	FMV01202	Performance Label Materials	18
9495MP	3M™ Double Coated Tapes	16	FMV01402	Performance Label Materials	18
9500PC	3M™ Double Coated Tapes	16	FMV02	Performance Label Materials	18
9690	3M™ Double Coated Tapes	16	FMV22	Performance Label Materials	18
9703	3M™ Anisotropic Conductive Film (ACF) Adhesives	7	FP0862	Performance Label Materials	18
9703	3M™ Electrically Conductive Adhesive Transfer Tapes	6	FVS14S	Protective Tapes	10
9705	3M™ Anisotropic Conductive Film (ACF) Adhesives	7	OFM010N	Performance Label Materials	18
9705	3M™ Electrically Conductive Adhesive Transfer Tapes	6	OFM03402	Performance Label Materials	18
9706	3M™ Electrically Conductive Adhesive Transfer Tapes	6	OFM03502	Performance Label Materials	18
9707	3M™ Electrically Conductive Adhesive Transfer Tapes	5	OFM2402	Performance Label Materials	18
9708	3M™ Electrically Conductive Adhesive Transfer Tapes	5	TM-670SA	Thermally Conductive Interface Materials	2, 3
9709	3M™ Electrically Conductive Adhesive Transfer Tapes	5	TM-671SA	Thermally Conductive Interface Materials	2, 3
9709S	3M™ Electrically Conductive Adhesive Transfer Tapes	5	TM-672SA	Thermally Conductive Interface Materials	2, 3
9709SL	3M™ Electrically Conductive Adhesive Transfer Tapes	5	X-7001	Metalized Cloth	9

Faster Assembly



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