



Technical Bulletin

Typical Properties for 3M™ Electrically Conductive Adhesive Films

February, 2000

General Information

This publication is intended to aid the user in the selection of the appropriate 3M™ Electrically Conductive Adhesive product for their application. The tables included as part of this document compare the relevant physical properties of all the products.

Note: The information presented should be considered representative or typical and should not be used for specification purposes. The user is responsible for evaluating the adhesive film under actual conditions of use and with the substrates intended for the user's application, to determine whether the film is suitable for a particular use and method of application. Also, the user is advised to obtain and read the data pages relevant to the product selected for use.

The top of each table lists the product number and the primary application for which the product is intended. The tables are broken into sections: Construction, Design Rules, Performance, Bonding, Shelf Life and Ordering Information.

Construction: Provides information on the adhesive type and thickness, liner type and conductive media used in the product.

Design Rules for the Primary Application: Provides information such as the minimum space between conductors and minimum overlap area required to obtain good electrical properties in the bond.

Performance in the Primary Application: Performance can depend greatly upon the design of the application and the chemical nature of the substrates to be bonded. This document reports data for common substrates used in the application. More detailed information concerning the performance testing may be obtained in the specific data page. The temperature cycling range reflects the temperature range over which 3M has tested the adhesive using test vehicle parts. Contact your 3M Customer Service Representative or read the product data page for more information regarding performance testing.

Bonding Conditions: A brief overview of the required temperature and pressure and time of bonding is listed. Some products require thermocompression bonders to apply heat and pressure to the bondline. Please consult a 3M Customer Service Representative to obtain technical bulletins for detailed bonding instructions and contact information for bonding equipment manufacturers.

Shelf Life: The recommended storage conditions and shelf life for each product is provided. Some products require freezer storage when not in use.

Ordering Information: Standard product sizes (length and width) as well as maximum sizes are provided. Special requirements for longer lengths or other non-standard sizes should be discussed with your 3M Customer Service Representative.

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Typical Properties for 3M™ Electrically Conductive Adhesive Films

Typical Properties – 7000 and 9000 Series								
	9713		9703		7303		7373	
Primary Application	EMI/RFI Shielding Attach		PET Silver ink flex to flex or mechanically supported flex to PCB		PET flex to PCB or flex to flex		PCB to Heat Sink (grounded) in High Frequency PCB	
Construction								
Adhesive	Acrylic (PSA)		Acrylic (PSA)		Acrylic/Epoxy Blend (PSA/Thermoset)		Acrylic/Epoxy Blend (PSA/Thermoset)	
Liner Type	PCK/Silicone		PCK/Silicone		PCK/Silicone		PCK/Silicone	
Adhesive Thickness	mils	microns	mils	microns	mils	microns	mils	microns
	3.0	75	2.0	50	2.8	70	2	50
Particle Metal	Nickel coated		Silver coated		Silver coated		Silver coated	
Particle Type	carbon fibers		nickel bead		40 micron glass bead		glass bead	
Design Rules for Primary Application¹								
Minimum Free Space Between Conductors	N/A: XYZ Conductive		mils	mm	mils	mm	mils	mm
			15	0.38	10	0.25	10	0.25
Minimum Overlap Area	1/4 x 1/8 inch 6 mm x 3 mm		mils ²	mm ²	mils ²	mm ²	mils ²	mm ²
			5000	3.2	1200	0.8	2500	1.6
Performance in Primary Application²								
Temperature Cycling Range	-40 / 70°C		-40 / 70°C		-40 / 80°C		-55 / 125°C	
Interconnect Resistance	< 0.05 to 1 Ω		0.2 to 5 Ω		0.2 Ω		0.5 mΩ	
Resistance Stability	< 2 Ω		< 10 Ω		< 5 Ω		< 1 mΩ	
Peel Strength (24 hour dwell)	lbs/inch	g/cm	lbs/inch	g/cm	lbs/inch	g/cm	lbs/inch	g/cm
	> 3.0	> 500	> 3.0	> 500	3	500	9	1600
Bonding Conditions³								
Pressure	psi	kg/cm ²	psi	kg/cm ²	psi	kg/cm ²	psi	kg/cm ²
	15	1.0	15	1.0	250	17.6	300	21.1
Temperature Time	Room Temp		Room Temp		135°C		160°C	
	seconds		seconds		25 seconds		30 minutes	
Shelf Life								
Room Temp	24 mo		24 mo		9 mo		1 yr	
Ordering Information⁴								
Available Width	Rolls: 1/4 to 14"		Rolls: 1/4 to 14"		Rolls: 5 mm		Rolls: 1 to 14"	
Std Length	108 yd		36 yd		20 m		36 yds	
Maximum Size	14" wide x 108 yds		14" wide x 108 yds		14" wide x 108 yds		14" wide x 108 yds	

¹ The user is responsible for qualification of the product in their application.

² Performance values depend upon the the application design and the substrates to be bonded.

³ Please consult the product specific Bonding Conditions Technical Bulletin before making actual bonds. The conditions listed here are only rough guidelines.

⁴ Special requirement for longer lengths and other non-standard orders should be discussed with 3M Customer Service Representatives.

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Typical Properties for 3M™ Electrically Conductive Adhesive Films

Typical Properties – 5000 Series								
	5303		5552		5352		5460	
Primary Application	> 140 micron pitch PI Flex to ITO or PCB		< 100 micron pitch PI Flex to ITO		> 100 micron pitch PI Flex to ITO		> 200 micron pitch PI Flex to PCB	
Construction								
Adhesive	Cyanate Ester + Thermoplastic		Cyanate Ester and Epoxy Thermoset + Thermoplastic					
Liner Type	PET/Silicone		PET/Silicone		PET/Silicone		PET/Silicone	
Adhesive Thickness	mils	microns	mils	microns	mils	microns	mils	microns
	1 and 2	25 and 50	0.76	19	0.84	21	1.6	40
Particle Metal	Nickel coated		Gold coated		Nickel coated		Gold plated	
Particle Type	10 micron polymer		6 micron polymer		10 micron polymer		7 micron nickel	
Design Rules for Primary Application⁵								
Minimum Space Between Conductors	mils	µm	mils	µm	mils	µm	mils	µm
	2.75	70	1.37	35	2	50	4	100
Minimum Overlap Area	mils ²	µm ²	mils ²	µm ²	mils ²	µm ²	mils ²	µm ²
	100	65,000	23	15,000	100	65,000	100	65,000
Performance in Primary Application⁶								
Temperature Cycling Range	-55 / 125°C		-55 / 125°C		-55 / 125°C		-55 / 125°C	
Interconnect Resistance	< 0.05 Ω		< 5 Ω		< 5 Ω		< 0.05 Ω	
Resistance Stability	0.01 Ω		< 20 Ω		< 5 Ω		0.01 Ω	
Max Current	NA		50 mA / 0.1 mm ²		100 mA / 0.1 mm ²		100 mA / 0.1 mm ²	
Max Voltage	NA		50 V		50 V		250 V	
Peel Strength	lbs/inch	g/cm	lbs/inch	g/cm	lbs/inch	g/cm	lbs/inch	g/cm
	6	1000	4.8	800	6	1000	6	1000
Bonding Conditions⁷								
Pretacking	80 to 100°C at 1 to 10 kg/cm ² for 3 to 5 seconds							
Bonding	170 to 190°C at 20 to 40 kg/cm ² for 20 to 30 seconds							
Shelf Life								
Room Temp	2 wks		4 wks		4 wks		4 wks	
Freezer	12 mo		12 mo		12 mo		12 mo	
Ordering Information⁸								
Std. Width	2 and 3 mm		1.5 and 2.0 mm		1.5, 2.0, 2.5 and 3.0 mm		1.5, 2.0, 2.5 and 3.0 mm	
Std. Length	10 and 50 m		10 and 50 m		10, 50 and 100 m		10 and 50 m	

⁵ The user is responsible for qualification of the product in their application.

⁶ Performance values depend upon the the application design and the substrates to be bonded. Product usage outside these guidelines should be discussed with your 3M Technical Service Representative.

⁷ Please consult the Notes on Bonding of the 5000 series 3M Z-Axis Films Technical Bulletin before making actual bonds. The conditions listed here are only rough guidelines.

⁸ Special requirement for longer lengths and other non-standard orders should be discussed with 3M Customer Service Representatives.

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Terms and Definitions:

PSA	Pressure Sensitive Adhesive requires no heat bonding step.
PCK	Poly Coated Kraft paper, silicone coated liner for products.
PCB	Printed Circuit Board.
PET	Polyester terephthylate, modest temperature performance, low cost flexible circuit base material.
PI	Polyimide, high temperature performance, higher cost flexible circuit base material.

For Additional Information

To request additional product information or to arrange for sales assistance, call toll free 1-800-362-3550. Address correspondence to: 3M Bonding Systems Division, 3M Center, Building 220-7E-01, St. Paul, MN 55144-1000. Our fax number is 651-733-9175. In Canada, phone: 1-800-364-3577. In Puerto Rico, phone: 1-809-750-3000. In Mexico, phone: 5-728-2180.

Important Notice

3M MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. User is responsible for determining whether the 3M product is fit for a particular purpose and suitable for user's method of application. Please remember that many factors can affect the use and performance of a 3M product in a particular application. The materials to be bonded with the product, the surface preparation of those materials, the product selected for use, the conditions in which the product is used, and the time and environmental conditions in which the product is expected to perform are among the many factors that can affect the use and performance of a 3M product. Given the variety of factors that can affect the use and performance of a 3M product, some of which are uniquely within the user's knowledge and control, it is essential that the user evaluate the 3M product to determine whether it is fit for a particular purpose and suitable for the user's method of application.

Limitation of Remedies and Liability

If the 3M product is proved to be defective, THE EXCLUSIVE REMEDY, AT 3M'S OPTION, SHALL BE TO REFUND THE PURCHASE PRICE OF OR TO REPAIR OR REPLACE THE DEFECTIVE 3M PRODUCT. 3M shall not otherwise be liable for loss or damages, whether direct, indirect, special, incidental, or consequential, regardless of the legal theory asserted, including, but not limited to, contract, negligence, warranty, or strict liability.



This Bonding Systems Division product was manufactured under a 3M quality system registered to ISO 9002 standards.



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