



TECHNICAL DATASHEET

# ABLEBOND® 84-1LMISR4

## ELECTRICALLY CONDUCTIVE DIE ATTACH ADHESIVE

**DESCRIPTION**

ABLEBOND® 84-1LMISR4 electrically conductive die attach adhesive has been formulated for use in high throughput, automatic die attach equipment. The rheology of ABLEBOND 84-1LMISR4 adhesive allows minimum adhesive dispense and die put down dwell

times, without tailing or stringing problems. The unique combination of adhesive properties makes this material one the most widely used die attach materials in the semiconductor industry.

**FEATURES**

- Excellent dispensability with minimal tailing and stringing
- Box oven cure

Typical Uncured Properties	ABLEBOND 84-1LMISR4	Test Description	Test Method
Filler Type	Silver		
Viscosity @ 25°C	8000 cP	Brookfield CP51 @ 5 rpm	ATM-0018
Thixotropic Index	5.6	Viscosity @ 0.5/Viscosity @ 5 rpm	ATM-0089
Work Life @ 25°C	18 hours	Physical worklife by % filler	ATM-0067
Storage Life @ -40°C	1 year		ATM-0068
Cure Process Data	ABLEBOND 84-1LMISR4	Test Description	Test Method
Weight Loss on Cure	5.3%	10 x 10 mm Si die on glass slide	ATM-0031
Recommended Cure Condition	1 hour @ 175°C		
Alternate Cure Condition <sup>(1)</sup>	3 - 5°C / min ramp to 175°C + 1 hour @ 175°C		
<i><sup>(1)</sup> The ramp was observed to yield reduced bondline voiding and increased strength</i>			
<i>The above cure profiles are guideline recommendations. Cure conditions (time and temperature) may vary based on customers' experience and their application requirements, as well as customer curing equipment, oven loading and actual oven temperatures.</i>			
PHYSIOCHEMICAL PROPERTIES - Post Cure	ABLEBOND 84-1LMISR4	Test Description	Test Method
Ionic Chloride	< 20 ppm	Teflon flask, 5 gm sample/20-40 mesh, 50 gm DI water, 100°C for 24 hours	ATM-0007
Sodium	< 10 ppm		
Potassium	< 10 ppm		
Water Extract Conductivity	13 µmhos/cm	Conductometer	ATM-0044
pH	6	pH meter	ATM-0002
Weight Loss @ 300°C	0.35%	Thermogravimetric analysis	ATM-0073

The figures shown above are typical values only. If you need to write a specification, please request our current Standard Release Specification.



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<b>PHYSIOCHEMICAL PROPERTIES - Post Cure</b>				<b>ABLEBOND 84-1LMISR4</b>	<b>Test Description</b>	<b>Test Method</b>
Glass Transition Temperature	120°C		TMA penetration mode		ATM-0058	
Coefficient of Thermal Expansion	Below Tg	40 ppm/°C	TMA expansion mode		ATM-0055	
	Above Tg	150 ppm/°C				
Dynamic Tensile Modulus	@ -65°C	4400 MPa (640,000 psi)	Dynamic mechanical thermal analysis using < 0.5mm thick sample		ATM-0112	
	@ 25°C	3900 MPa (570,000 psi)				
	@ 150°C	2000 MPa (290,000 psi)				
	@ 250°C	300 MPa (44,000 psi)				
Moisture Absorption @ Saturation	0.6%		Dynamic vapor sorption after 85°C/85% RH exposure		ATM-0093	
<b>THERMAL/ELECTRICAL PROPERTIES - Post Cure</b>				<b>ABLEBOND 84-1LMISR4</b>	<b>Test Description</b>	<b>Test Method</b>
Thermal Conductivity @ 121°C	2.5 W/mK		C-MATIC conductance tester		ATM-0017	
Volume Resistivity	0.0001 ohm-cm		4-point probe		ATM-0020	
<b>MECHANICAL PROPERTIES - Post Cure</b>				<b>ABLEBOND 84-1LMISR4</b>	<b>Test Description</b>	<b>Test Method</b>
Die Shear Strength @ 25°C	19 kg <sub>f</sub> /die		2 x 2mm (80 x 80 mil) Si die on Ag/Cu leadframe		ATM-0052	
Die Shear Strength (kg <sub>f</sub> /die) vs. Temperature	@25°C	@200°C	@250°C	Substrate	3 x 3 mm (120 x 120 mil) Si die	ATM-0052
	21	2.9	1.7	Ag/Cu LF		
	11	2.6	1.4	Bare Cu LF		
	27	2.4	2.0	Pd/Ni/Cu LF		
Die Shear Strength (kg <sub>f</sub> /die) after 85°C/85% RH exposure for 168 hours	@25°C	@200°C	Substrate		3 x 3 mm (120 x 120 mil) Si die	ATM-0052
	12	1.8	Ag/Cu LF			
	10	2.5	Bare Cu LF			
	23	1.8	Pd/Ni/Cu LF			
Chip Warpage (µm) @ 25°C vs. Chip Size	Chip Size		Warpage	0.38mm (5 mil) thick Si die on 0.2mm thick Ag/Cu LF		ATM-0059
	7.6 mm (300 x 300 mil)		19 µm			
	10.2 x 10.2 mm (400 x 400 mil)		32 µm			
	12.7 x 12.7 mm (500 x 500 mil)		51 µm			
Chip Warpage (µm) vs. Post Cure Thermal Process <sup>(2)</sup>	Substrate	Ag/Cu LF	Bare Cu LF	3 x 3 mm (120 x 120 mil) Si die		ATM-0059
	Post Cure	20 µm	22 µm			
	+ Wirebond (1 min @ 250°C)	29 µm	30 µm			
	+ Post Mold Bake (4 hrs @ 175°C)	28 µm	28 µm			

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### APPLICATION GUIDELINES

#### SHIPMENT

This Ablestik product is packed and shipped in dry ice at  $-80^{\circ}\text{C}$ . Inside every dry ice shipment of Ablestik's products is a small packet containing the ABLECUBE. This is a small blue cube which retains its shape at  $-40^{\circ}\text{C}$ . If the ABLECUBE is exposed to temperatures higher than  $-40^{\circ}\text{C}$ , the cube will melt. Please check the state of the ABLECUBE to ensure the integrity of the shipment. If the ABLECUBE has melted upon Receiving inspection, place the entire shipment in a  $-40^{\circ}\text{C}$  freezer and contact your Ablestik Customer Service or Sales Representative.

#### UNPACKING

Transfer the syringes from the dry ice to a  $-40^{\circ}\text{C}$  freezer without ANY delays. Freeze-thaw voids will form in the syringes if the syringes are repeatedly thawed and refrozen.

#### STORAGE

This Ablestik product must be stored at  $-40^{\circ}\text{C}$ . If stored at these conditions, ABLEBOND 84-1LMISR4 adhesive may be usable for up to one (1) year. Alternate storage conditions may be used as follows:

Storage Temp	Syringes	Jars
$0^{\circ}\text{C}$ to $+5^{\circ}\text{C}$	8 days	1 month*
$-15^{\circ}\text{C}$ to $-10^{\circ}\text{C}$	2 months	6 months**

\* Jar rolling required

The shelf life of the material is only valid when the material has been stored at the correct storage condition. Incorrect storage conditions will degrade the performance of the material in both handling (e.g. dispensing) and final cured properties.

#### THAWING

Allow the container to reach room temperature before use. After removing from the freezer, set the syringes to stand vertically while thawing. Refer to the Syringe Thaw Time chart for the thaw time recommendation.

DO NOT open the container before contents reach ambient temperature. Any moisture that collects on the thawed container should be removed prior to opening the container.

DO NOT re-freeze. Once thawed to room temperature, the adhesive should not be re-frozen.

### ADHESIVE APPLICATION

Thawed adhesive should be immediately placed on dispense equipment for use. If the adhesive is transferred to a final dispensing reservoir, care must be exercised to avoid entrapment of contaminants and/or air into the adhesive. Adhesive must be completely used within the product's recommended work life of 18 hours. Silver-resin separation may occur if the adhesive is left out at ambient beyond the recommended work life.

Apply enough adhesive to achieve a 25-50  $\mu\text{m}$  (1-2 mil) wet bondline thickness, dispensed with approximately 25% - 50% filleting on all sides of the die. Alternate dispense amounts may be used depending on the application requirements. Star or crossed shaped dispense patterns will yield fewer bondline voids than the matrix style of dispense pattern.

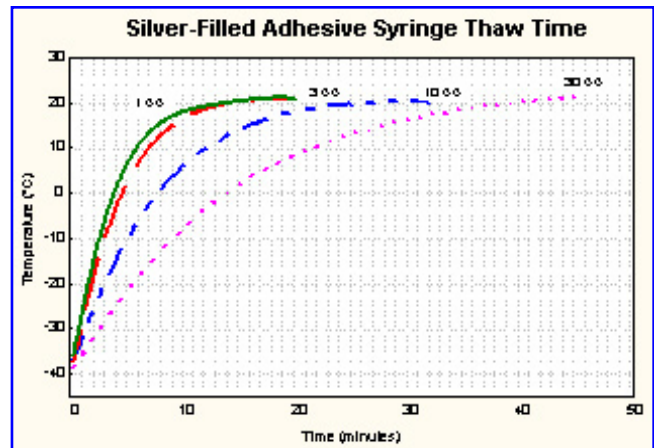
Contact your Ablestik Technical Service Department for detailed recommendation on adhesive application, including dispensing.

### CURE

This adhesive should be cured in conventional box oven per the recommended cure condition. Refer to the Cure Process Data section of the Technical Data Sheet for the recommended cure cycles.

### AVAILABILITY

ABLEBOND<sup>®</sup> adhesives are packaged in syringes or jars per customer specification. Available package sizes range from 1cc to 30cc and 1 ounce to 1 pound. For details, refer to the Ablestik Standard Package Data Set or contact your Customer Service Representative.



CAUTION: This product may cause skin irritation in sensitive persons. Avoid skin contact. If contact does occur, wash area immediately with soap and water. Please refer to the Material Safety Data Sheet for more details.



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For a technical contact nearest you, visit

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The information given and the recommendations made herein are believed to be accurate but no guarantee of their accuracy is made. In every case we recommend that purchasers before using any product conduct their own tests to determine whether the product is suitable for their particular purposes under their own operating conditions. No representative of ours has any authority to waive or change the foregoing provisions but, subject to such provisions, our engineers are available to assist purchasers in adapting our products to their needs. Nothing contained herein shall be construed to imply the nonexistence of any relevant patents or to constitute a permission, inducement or recommendation to practice any invention covered by any patent, without the authority from the owner of this patent. These materials are not designed or manufactured for implantation in the human body. Approval from FDA for such use as part of any product to be implanted in the human body has NOT been sought nor received. We also expect purchasers to use our products in accordance with the guiding principles of the American Chemistry Council's Responsible Care<sup>®</sup> program.