

# 3M™ Thermal Transfer Acrylate Label Material 3921

## Product Description

3M™ Thermal Transfer Acrylate Label Material 3921 consists of a non-topcoated acrylate facestock designed for thermal transfer printing and withstand high temperatures and resist chemicals such as those found in the fabrication of printed circuit boards (PCBs).



## Product Features

- Matte white facestock for good print contrast and easy readability of barcodes and variable information.
- Acrylic based film for good dimensional stability at high temperatures.
- 3M™ Acrylic Adhesive 150 will not degrade when exposed to standard printed circuit board assembly conditions.
- 55# densified kraft liner assures consistent die cutting.

## Technical Information Note

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

## Typical Physical Properties

Property	Values	
Facestock	Matte White Cast Acrylate Film	
Facestock Thickness	0.051 mm	2.0 mil
Adhesive	#150 Acrylic	
Adhesive Thickness	0.025 mm	1.0 mil
Liner	55# Densified Kraft	
Liner Thickness	0.076 mm	3.0 mil

## Note

Calipers are nominal values

## Typical Performance Characteristics

180° Peel Adhesion		Dwell/Cure Time	Substrate
5.9 N/cm	54 oz/in	10 min @ Room Temperature	Stainless Steel
7.2 N/cm	66 oz/in	10 min @ Room Temperature	Polycarbonate (PC)
0.44 N/cm	4 oz/in	10 min @ Room Temperature	Polypropylene (PP)
Facestock tore N/cm		10 min @ Room Temperature	Epoxy PC Board
5.8 N/cm	53 oz/in	72 hr @ Room Temperature	Stainless Steel
6.3 N/cm	58 oz/in	72 hr @ Room Temperature	Polycarbonate (PC)
5.6 N/cm	51 oz/in	72 hr @ Room Temperature	Polypropylene (PP)
Facestock tore		72 hr @ Room Temperature	Epoxy PC Board
7.4 N/cm	68 oz/in	72 hr @ 120°F(49°C)	Stainless Steel
7.6 N/cm	70 oz/in	72 hr @ 120°F(49°C)	Polycarbonate (PC)
3.8 N/cm	35 oz/in	72 hr @ 120°F(49°C)	Polypropylene (PP)
Facestock tore N/cm		72 hr @ 120°F(49°C)	Epoxy PC Board
Facestock tore N/cm		24 hr @ 90°F(32°C) at 90% Relative Humidity	Stainless Steel
7.4 N/cm	68 oz/in	24 hr @ 90°F(32°C) at 90% Relative Humidity	Polycarbonate (PC)

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**Typical Performance Characteristics (continued)**

180° Peel Adhesion		Dwell/Cure Time	Substrate
5.4 N/cm	50 oz/in	24 hr @ 90°F(32°C) at 90% Relative Humidity	Polypropylene (PP)
Facestock tore N/cm		24 hr @ 90°F(32°C) at 90% Relative Humidity	Epoxy PC Board

Property: 180° Peel Adhesion  
Method: ASTM D3330

180° Liner Release		Test Condition
0.085 N/cm width	22 g/in width	90 in/min
0.089 N/cm width	23 g/in width	300 in/min

Property: 180° Liner Release

**Typical Environmental Performance****Chemical and Environmental Exposure**

The properties defined are based on 4-hour immersions at room temperature (72°F/22°C) unless otherwise noted. Samples were applied to stainless steel panels 24 hours prior to immersion and were evaluated one hour after removal from the solution for peel adhesion. Adhesion measured at 180° peel angle (ASTM D 3330) at 12 inches/minute.

Chemical	Adhesion to Stainless Steel		Appearance	Edge Penetration
	Oz./in.	N/100 mm	Visual	Millimeters
Isopropyl Alcohol	–	–	Label slipped off	–
Detergent *1% Alconox® Cleaner	83	90	No change	0
Engine Oil (10W30) @ 250°F (121°C)	81	88	No change	0
Water for 48 hours	–	–	Label slipped off	–
pH 4	90	98	No change	0
pH 10	92	100	No change	0
409® Formula	82	89	No change	0
Toluene	–	–	Label slipped off	–
Acetone	–	–	Label slipped off	–
Brake Fluid	–	–	Label slipped off	–
Gasoline	29	32	No change	0
Diesel Fuel	61	66	No change	0
Mineral Spirits	56	61	No change	0
Hydraulic Fluid	72	78	No change	0

**Humidity Resistance**

24 hours at 100°F (38°C) and 100% relative humidity: no significant change in appearance or adhesion

**Temperature Resistance**

530°F (277°C) for 30 seconds: no significant visual change

500°F (260°C) for 7 minutes: slight browning

-40°F (-40°C) for 24 hours: no significant visual change

**Typical Environmental Performance (continued)**

Accelerated Aging		Notes
0.042 N/cm	11 g/in	180° Removal of Liner from Facestock at 90 in/min
6.2 N/cm	57 g/in	180° Peel Adhesion from Stainless Steel at 12 in/min

Property: Accelerated Aging

Method: ASTM D3611

Test Condition : 96 hr @ 150°F (65°C) and 80% relative humidity

**Printed Label Performance**

Depending upon the ribbon selection and the size of the barcode, adjustments to the printer burn temperature setting, print head pressure, and print speed may be necessary to achieve desired print images. In addition, printer maintenance and print head cleaning should be performed on a routine basis to assure optimal print image quality.

Because of the limited space available on PCBs, labels are typically small and require the use of narrow 6-mil wide bars. To achieve desired resolution on narrow X-dimension barcodes, more heat, slower print speeds, and proper head pressure are required.

The following ribbons have been tested and were found to perform well in PCB board soldering applications, including exposure to some representative de-fluxing and washing solutions.

Ribbon	Burn Temp. Setting (0-30)	Bar Gains (mils)
Armor AXR7+	28	+0.01
Sony TR4070	28	-0.02
Armor AXR7	28	-0.02

All samples were printed on a Zebra 170xi printer at 2-in/min print speed. Barcodes were 3:1 ratio with a 6-mil bar width. Maximum burn temperature setting on the Zebra printer is a setting of 30. Bar Gain was measured using a PSC QUICKCHECK® PC 600 Verifier with a #03 wand with an aperture of 0.003 in Target value would be +0.00 with a tolerance of ± 0.03 bar gain

All printed samples had 100% first read rates and high print contrast signal values. The Armor AXR7+ ribbon performed the best, but required a greater printhead pressure. The Sony TR4070 and the Armor AXR7 required less printhead pressure.

Performance was not as good as the Armor AXR7+.

To minimize burn temperature settings and maximize print head life, the print head pressure and print speed need to be optimized. Heating the printed label to reflow or wave solder temperatures increases the image resistance to solvent attack.

Because of variability in printers and run conditions, it is strongly recommended that these ribbons be tested on the user's equipment for suitable run conditions and printability. Printed labels should also be tested in end user's application to determine suitability.

**Processing**

Printing: Facestock is designed for thermal transfer printing. Call 3M Customer Service at 1-800-422-8116 for additional information.

Recommended Ribbons: The following ribbons can be used but may require higher burn temperatures:

Armor: AXR7+, AXR7

Sony: TR4070

Die-cutting: Rotary die cutting is recommended.

Dispensing: Hand dispensing is recommended.

Packaging: Finished labels should be stored in plastic bags.

**Handling/Application Information****Application Ideas**

- Printed circuit board tracking labels that see the following conditions:
  - Solder re-flow.
  - Top and/or bottom side wave solder.
  - Most cleaning processes and chemicals.
- Labeling on parts exposed to high temperatures.

## Handling/Application Information (continued)

### Application Techniques

For maximum bond strength, the surface should be clean and dry. Typical cleaning solvents are heptane and isopropyl alcohol.\*

For best bonding conditions, application surface should be at room temperature or higher. Low temperature surfaces, below 50°F (10°C), can cause the adhesive to become so firm that it will not develop maximum contact with the substrate. Higher initial bonds can be achieved through increased rubdown pressure.

\*When using solvents, read and follow the manufacturer's precautions and directions for use.

### Storage and Shelf Life

Store at room temperature conditions of 72°F (22°C) and 50% relative humidity.

If stored under proper conditions, product retains its performance and properties for one year from date of manufacture.

### Industry Specifications

UL Recognized (File MH11410)

### Trademarks

3M is a trademark of 3M Company.

PSC QUICKCHECK is a registered trademark of PSC.

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### References

1. Safety Data Sheet

Url: [https://www.3m.com/3M/en\\_US/company-us/SDS-search/results/?gsaAction=msdsSRA&msdsLocale=en\\_US&co=ptn&q=3921](https://www.3m.com/3M/en_US/company-us/SDS-search/results/?gsaAction=msdsSRA&msdsLocale=en_US&co=ptn&q=3921)

### ISO Statement

This Industrial Adhesives and Tapes Division product was manufactured under a 3M quality system registered to ISO 9001 standards.

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