

# ATROX<sup>®</sup> 590-4HT1

## Electrically and Thermally Conductive Die Attach Adhesion

### DESCRIPTION

**ATROX 590-4HT1** is a low stress thermosetting conductive die attach with high thermal conductivity designed for high power semiconductors and exposed pad semiconductor packages. **ATROX 590-4HT1** die attach has excellent adhesive strength to Cu, NiPdAu lead-frames and solder-mask surfaces. **ATROX 590-4HT1** has low out gassing which minimizes oven contamination and is ideal for excellent MSL performance.

READ ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT

### TYPICAL PROPERTIES

| Material Properties   | Method         | Value         | Remarks               |
|---|----------------|---------------|-----------------------|
| <b>A. Uncured</b>   |                |               |                       |
| Chemical type   |                | Thermosetting |                       |
| Color   | Visual         | Grey          |                       |
| Viscosity at 25 °C at 0.5 RPM                                 | ASTM D2196-99  | ~47,000 cps   | Brookfield Spindle 51 |
| Viscosity at 25 °C at 5.0 RPM                                 | ASTM D2196-99  | ~ 10,500 cps  | Brookfield Spindle 51 |
| Thixotropic index (0.5 RPM/5.0 RPM)                           | ASTM D2196-99  | 4.5           | Brookfield Spindle 51 |
| Pot Life @ 23 °C (Elapsed time for 25% increase in viscosity) | ISO 10364:1993 | >24 hours     | Brookfield Spindle 51 |
| Storage Temperature   |                | -40 °C        |                       |
| Shelf Life @ -40 (°C/°F)                                      |                | 6 months      |                       |
| <b>B. Cured</b>   |                |               |                       |
| Glass Transition (Tan δ Max)                                  | DMA            | 132 °C        |                       |
| Modulus at 25 °C  | DMA            | 3.5 GPa       |                       |
| Modulus at 260 °C   | DMA            | 0.48 GPa      |                       |

| Material Properties            | Method                                    | Value                             | Remarks |
|--------------------------------|---|-----------------------------------|---------|
| CTE 1 (below Tg)               | TMA                                       | 21 ppm                            |         |
| CTE 2 (below Tg)               | TMA                                       | 147 ppm                           |         |
| Thermal Conductivity:<br>Bulk  | Laser Flash                               | 20.8 W/mK                         |         |
| Volume Resistivity             | 4-Point Probe                             | 0.00008 Ohm-cm                    |         |
| Bond Joint Resistance          | nVoltmeter                                | 0.0004<br>Ohms/0.5in <sup>2</sup> |         |
| % Moisture Absorption          | 72 hrs. @<br>85%RH/85 °C                  | 0.29%                             |         |
| Thermal Stability at 300 °C    | TGA of cured<br>sample- Ramp to<br>450 °C | 0.07 %                            |         |
| TGA Weight Loss during<br>Cure | TGA<br>(175 °C/1hour)                     | 0.8 %                             |         |

#### DIE SHEAR STRENGTH (1.8 mm x 2.5 mm)

##### A. Bare Si Die (1.8 mm x 2.5 mm)

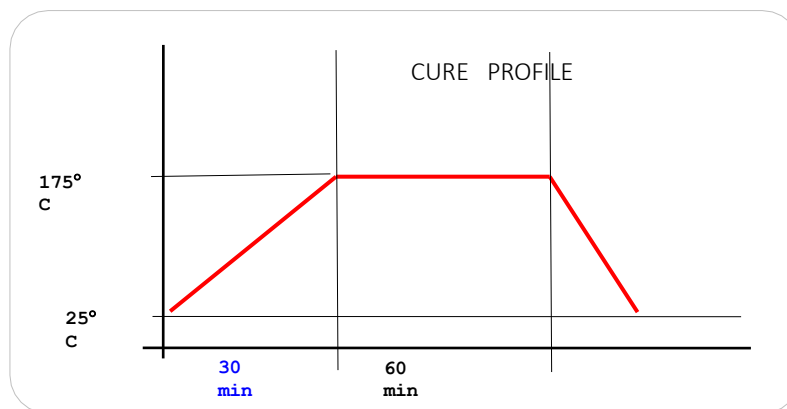
| Lead Frame  | Cure Condition          | Measuring Temperature | Value  |
|-------------|-------------------------|-----------------------|--------|
| PPF         | 175 °C/4hr              | 260 °C                | 2.0 Kg |
| PPF         | 175 °C/4hr + 24 hr. PCT | 260 °C                | 1.7 Kg |
| Cu          | 175 °C/4hr              | 260 °C                | 1.9 Kg |
| Cu          | 175 °C/4hr + 24 hr PCT  | 260 °C                | 1.7 Kg |
| Solder-mask | 175 °C/4hr              | 260 °C                | >3 Kg  |
| Solder-mask | 175 °C/4hr + 24 hr PCT  | 260 °C                | >3 Kg  |

**MATERIAL APPLICATION**

ATROX 590-4HT1 is formulated to be applied using a time pressure pump equipped on most die bonders. The material should be consistently dispensed over time. Equipment settings need to be optimized for desired material deposition response based on model and configuration.

**CURE**

ATROX 590-4HT1 cures in ~60 minutes at 175 °C. For box oven cure, it is recommended that the cure schedule includes at ramp at 5 to 10 °C and a controlled cooling cycle to minimize thermal stresses. Depending on thermal mass of application cure times may vary and should be optimized by the end user.

**CLEAN-UP**

Uncured material may be cleaned from dispenser components and surfaces with a variety of solvents, including IPA, acetone, MEK, methylene chloride, etc. Always wash and dry thoroughly prior to re-use of the dispenser components. The cleaning technique should be active cleaning of the components – flush, wash or wipe, followed by a drying step to ensure a clean, dry surface. Do not soak since this can solubilize the hardener within the uncured resin and curing (very difficult to remove). Contact your equipment supplier to ensure the solvent is compatible with their components. Clean and maintain dispense valves as recommended by the equipment manufacturer.

**PACKAGING SIZES**

ATROX 590-4HT1 is available in 5 or 10 cc EFD or Musashi syringes.

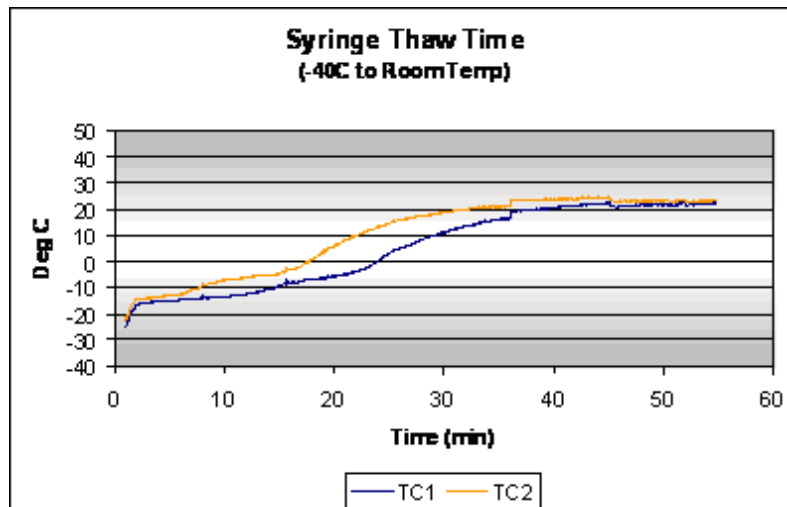
**SAFETY & WARNING**

It is recommended that the company/operator read and review the Safety Data Sheets for the appropriate health and safety warnings before use. **Safety Data Sheets are available.**

**SHIPPING & STORAGE**

Material is normally shipped in insulated boxes using dry ice to ensure that the ATROX 590-4HT1 maintains all its properties. On receipt, it must be ensured that dry-ice remnants are present in the insulated shipping box. If there is no dry ice, or if the material is not cold, then please contact MacDermid Alpha Electronics Solutions immediately. Exposing to elevated temperatures during shipment and storage will compromise on the performance aspect of the material adversely.

It is recommended to store the syringes of material at -40 °C for a maximum shelf life of 6 months. It is recommended that the material be allowed to thaw before usage. Typical thawing times for 5cc and 10cc syringes are presented in chart below. Remove the syringe from freezer and set aside, allowing it to thaw at room temperature, until it reaches room temperature (90 minutes maximum for 30cc syringe). To prevent contamination of unused product, do not return any material to its original container



**CONTACT INFORMATION**

To confirm this document is the most recent version, please contact  
**techinfo@MacDermidAlpha.com**

[www.macdermidalpha.com](http://www.macdermidalpha.com)

|   |  |  |
|---|--|--|
| <p><b>North America</b><br/>3950 Johns Creek Ct, Suite 300<br/>Suwanee, GA 30024 USA<br/>908.791.2300</p> | <p><b>Europe</b><br/>Unit 2, Genesis Business Park<br/>Albert Drive<br/>Woking, Surrey, GU21 5RW, UK<br/>44.01483.758400</p> | <p><b>Asia</b><br/>14 Joo Koon Crescent, Singapore<br/>629014<br/>65.6430.0700</p> |
|---|--|--|

Also read carefully warning and safety information on the Safety Data Sheet. This data sheet contains technical information required for safe and economical operation of this product. READ IT THOROUGHLY PRIOR TO PRODUCT USE. Emergency safety directory assistance: US 1 202 464 2554, Europe + 44 1235 239 670, Asia + 65 3158 1074, Brazil 0800 707 7022 and 0800 172 020, Mexico 01800 002 1400 and (55) 5559 1588

DISCLAIMER: All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed. No statement or recommendation shall constitute a representation unless set forth in an agreement signed by officers of seller and manufacturer. NO WARRANTY OF MERCHANTABILITY, WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR ANY IMPLIED WARRANTY IS MADE. The following warranty is made in lieu of such warranties and all other warranties, express, implied, or statutory. Products are warranted to be free from defects in material and workmanship at the time sold. The sole obligation of seller and manufacturer under this warranty shall be to replace any noncompliant product at the time sold. Under no circumstances shall manufacturer or seller be liable for any loss, damage or expense, direct, indirect, incidental or consequential, arising out of the inability to use the product. Notwithstanding the foregoing, if products are supplied in response to a customer request that specifies operating parameters beyond those stated above, or if products are used under conditions exceeding said parameters, the customer by acceptance or use thereof assumes all risk of product failure and of all direct, indirect, incidental and consequential damages that may result from use of the products under such conditions, and agrees to exonerate, indemnify, defend and hold harmless MacDermid, Incorporated and its affiliates therefrom. No suggestion for product use nor anything contained herein shall be construed as a recommendation to use any product in a manner that infringes any patent or other intellectual property rights, and seller and manufacturer assume no responsibility or liability for any such infringement.

© 2019 MacDermid, Inc. and its group of companies. All rights reserved. "(R)" and "TM" are registered trademarks or trademarks of MacDermid, Inc. and its group of companies in the United States and/or other countries.