



# 9773

## Light-Cure BGA, CSP Ruggedized Adhesive

### APPLICATIONS

- Reinforcement of Fine-Pitch or Leadless Components on Printed Circuit Boards
- Ruggedization/Staking Material
- Shock Absorption
- Underfill Alternative
- Encapsulant

### FEATURES

- UV/Visible Light Cure
- Low Outgassing
- Low Ionic Content Compliance with Mil-Std 883 Method 5011
- High Viscosity
- Halogen Free
- Silicone Free
- No Solvents Added

### OTHER FEATURES

- Mil Std 883 Method 5011 Compliant
- Adhesion to Various PCB Substrates
- Meets ASTM E595 Low Outgassing
- NASA MAPTIS Listed (Material Code 09907)
- Slump Resistance @ 90° up to 72 hours
- 23 Gauge Needle Tip Minimum for Dispensing
- Jetting Compatible

Dymax 9773 is a low outgassing, low ionic content, high-performance light-cure staking/ruggedizing material especially formulated to stabilize critical components on printed circuit boards in missiles, satellites, and spacecraft. This material is designed for rapid on-demand broad-spectrum curing. Dymax staking materials contain no nonreactive solvents and cure upon exposure to light. The ability of Dymax materials to cure in seconds enables faster processing, greater output, and lower processing costs. When cured with Dymax light-curing spot lamps, focused-beam lamps, or flood lamps, they deliver optimum speed and performance for printed circuit boards. Dymax lamps offer the ideal balance of UV and visible light for the fastest, deepest cures. This product is in full compliance with RoHS directives 2015/863/EU.

UNCURED PROPERTIES *		
Property	Value	Test Method
Solvent Content	No Nonreactive Solvents	N/A
Chemical Class	Acrylated Urethane	N/A
Appearance	Off-White to Slate Grey Translucent Gel	N/A
Soluble in	Organic Solvents	N/A
Density, g/ml	1.35	ASTM D1875
Viscosity, cP	52,500	ASTM D2556
Shelf Life at Recommended Conditions from Date of Manufacture	6 months	N/A

CURED MECHANICAL PROPERTIES *		
Property	Value	Test Method
Durometer Hardness	D50	ASTM D2240
Tensile at Break, MPa [psi]	12.0 [1700]	ASTM D638
Elongation at Break, %	85	ASTM D638
Modulus of Elasticity, MPa [psi]	103 [15000]	ASTM D638
Glass Transition Tg, °C	45	ASTM D5418
CTE $\alpha_1$ , $\mu\text{m}/\text{m}/^\circ\text{C}$	77	ASTM E831
CTE $\alpha_2$ , $\mu\text{m}/\text{m}/^\circ\text{C}$	150	ASTM E831

OTHER CURED PROPERTIES *		
Property	Value	Test Method
Boiling Water Absorption, % (2 h)	0.6	ASTM D570
Water Absorption, % (25°C, 24 h)	0.2	ASTM D570
Linear Shrinkage, %	0.6	ASTM D2566
Outgassing – Total Mass Loss (TML), %	0.86	ASTM E595
Outgassing – Collected Volatile Condensable Material (CVCM), %	0.04	ASTM E595
Thermal Stability @ 200°C	Passes	Mil-Std 883 Method 5011
Ionic Content	Passes	Mil-Std 883 Method 5011
Bond Strength @ RT after 1000hrs. @ 150°C	Passes	Mil-Std 883 Method 5011
Thermal Conductivity	Passes	Mil-Std 883 Method 5011
Thermal Conductivity	Passes	ASTM E1530-19/Mil-Std 883 Method 5011
Volume Resistivity	Passes	Mil-Std 883 Method 5011
Dielectric Constant & Dissipation Factor	Passes	Mil-Std 883 Method 5011

\* Not Specifications

N/A Not Applicable

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ELECTRONIC ASSEMBLY/ CIRCUIT BOARD MATERIALS  
9773 Staking/Encapsulant/Ruggedizing Product Data Sheet

ELECTRICAL PROPERTIES *		
Property	Value	Test Method
Volume Resistivity, ohm-cm	7.92E+11	ASTM D257
Surface Resistivity, ohm	1.23E+12	ASTM D257
Dielectric Constant, 1 MHz	4.46	ASTM D150
Dissipation Factor, 1 MHz	0.023	ASTM D150
Dielectric Strength, V/mil	739	ASTM D149
Dielectric Breakdown Voltage, V/mil	800	ASTM D149

ADHESION	
Substrate	Recommendation
PCB	✓
Silicon	✓
Leadframe	✓
Ceramic	✓

✓ Recommended      ○ Limited Applications  
st Requires Surface Treatment (e.g. plasma, corona treatment, etc.)

**CURING GUIDELINES**

UV-curing guidelines for 9773 at 2.5 mm thickness:

Dymax Curing System (Intensity)	Cure Time or Belt Speed
BlueWave® 200 (10 W/cm <sup>2</sup> ) <sup>A</sup>	4 s
UVCS Conveyor with Fusion F300S (2.5 W/cm <sup>2</sup> ) <sup>B</sup>	3m/min [10ft/min]

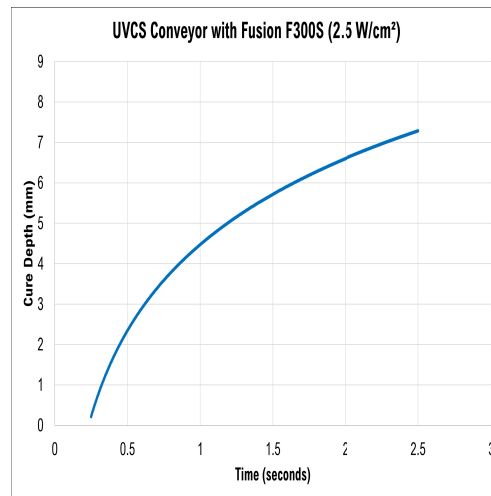
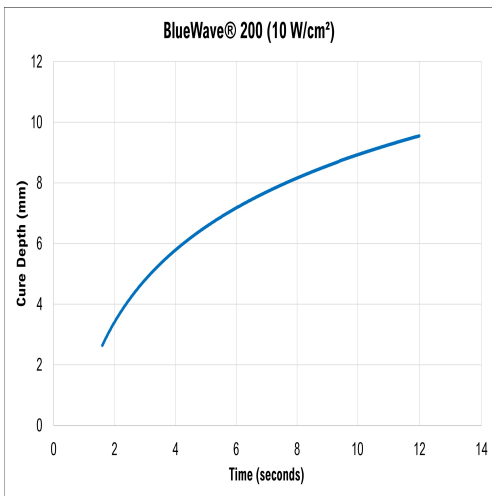
<sup>A</sup> Intensity was measured over the UVA range (320-395 nm) using a Dymax ACCU-CAL™ 50 Radiometer.

<sup>B</sup> Intensity was measured over the UVA range (320-395 nm) using a Dymax ACCU-CAL™ 160 Radiometer.

<sup>C</sup> Intensity was measured over the UVA/Visible range (350-450 nm) using a Dymax ACCU-CAL™ 50-LED Radiometer.

**DEPTH OF CURE**

The graph below shows the increase in depth of cure as a function of exposure time. A 9.5 mm [0.37 in] diameter specimen was cured in a polypropylene mold and cooled to room temperature. It was then released from the mold and the cure depth was measured.





## ELECTRONIC ASSEMBLY/ CIRCUIT BOARD MATERIALS 9773 Staking/Encapsulant/Ruggedizing Product Data Sheet

### OPTIMIZING PERFORMANCE AND HANDLING

1. This product cures with exposure to UV and visible light. Exposure to ambient and artificial light should be kept to a minimum before curing. Dispensing components including needles and fluid lines should be 100% light blocking, not just UV blocking.
2. All bond surfaces should be clean and free from grease, mold release, or other contaminants prior to dispensing the material.
3. Cure speed is dependent upon many variables, including lamp intensity, distance from the light source, required depth of cure, bond gap, and percent light transmission of the substrate.
4. Oxygen in the atmosphere may inhibit surface cure. Surfaces exposed to air may require high-intensity UV light to produce a dry surface cure. Flooding the bond area with an inert gas, such as nitrogen, can also reduce the effects of oxygen inhibition.
5. Parts should be allowed to cool after cure before testing and subjecting to any loads.
6. In rare cases, stress cracking may occur in assembled parts. Three options may be explored to eliminate this problem. One option is to heat anneal the parts to remove molded-in stresses. A second option is to open the gap between mating parts to reduce stress caused by an interference fit. The third option is to minimize the amount of time the liquid material remains in contact with the substrate(s) prior to curing.
7. Light curing generally produces some heat. If necessary, cooling fans can be placed in the curing area to reduce the heating effect on components.
8. At the point of curing, an air exhaust system is recommended to dissipate any heat and vapors formed during the curing process.

### DISPENSING THE MATERIAL

Dispense recommendations for this material include, but are not limited to the following:

- PVA Delta 6 Selective Coating/Dispensing System with JDX Series Valve
  - Travel Speed: 2-10 mm/sec
  - Nozzle Gauge: 200  $\mu$ m
  - Refill Time: 6 msec
  - Dwell Time: 30 sec
  - Fluid Pressure: 40 psi
  - Jet Pressure 60 psi
  - Dispense Height: 2 mm
  - Valve Temperature: 50 °C

The Dymax Application Engineering team is ready to discuss your application requirements to provide the most appropriate dispensing and/or spraying solution. Visit our current dispensing equipment portfolio [here](#) or consult our [global contact](#) phone numbers and online chat feature (available in North America only) during normal business hours for instant support.

### STORAGE AND SHELF LIFE

Store the material in a cool, dark place when not in use. Do not expose to light. This product may polymerize upon prolonged exposure to ambient and artificial light. Keep covered when not in use. This material shelf life noted on page 1 of this document, when stored between **10°C (50°F) and 32°C (90°F)** in the original, unopened container.

### CLEANUP

Uncured material may be removed from dispensing components and parts with organic solvents. Cured material will be impervious to many solvents and difficult to remove. Cleanup of cured material may require mechanical methods such as ultrasonic bath, water jet, vacuum tweezers, air knife, and/or warming to aid in the removal.



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### GENERAL INFORMATION

This product is intended for industrial use only. Keep out of the reach of children. Avoid breathing vapors. Avoid contact with skin, eyes, and clothing. Wear impervious gloves. Repeated or continuous skin contact with uncured material may cause irritation. Remove material from skin with soap and water. Never use organic solvents to remove material from skin and eyes. For more information on the safe handling of this material, please refer to the Safety Data Sheet before use.

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