



9309-SC

Light-Cure BGA, CSP Reinforcement Adhesive with See-Cure Technology

APPLICATIONS

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

FEATURES

- UV/Visible Light Cure
- Blue-to-Colorless Upon Exposure to UV/Visible Light

OTHER FEATURES

- High Viscosity
- Highly Thixotropic
- Adhesion to Various PCB Substrates
- Reduces Stress on Components

Dymax 9309-SC cures upon exposure to light and is designed for rapid ruggedization of circuit board components. The blue color of Dymax See-Cure products disappears when they are fully cured. Dymax See-Cure materials contain no nonreactive solvents and cure upon exposure to light. Their ability 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. Dymax lamps offer the ideal balance of UV and visible light for the fastest, deepest cures. This product is in full compliance with the 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	Blue Transparent Gel	N/A
Soluble in	Organic Solvents	N/A
Density, g/ml	1.05	ASTM D1875
Viscosity, cP (20 rpm)	45,000 (nominal)	ASTM D2556
Shelf Life @RT (22°C to 25°C) from Date of Manufacture	7 months	N/A

CURED MECHANICAL PROPERTIES *

Property	Value	Test Method
Durometer Hardness	D57	ASTM D2240
Tensile at Break, MPa [psi]	22 [3,200]	ASTM D638
Elongation at Break, %	140	ASTM D638
Modulus of Elasticity, MPa [psi]	163 [23,800]	ASTM D638
Glass Transition Temperature (T _g), °C	65	ASTM D5418
CTE _{α1} , (m/m/°C)	162	ASTM E831
CTE _{α2} , (m/m/°C)	204	ASTM E831

OTHER CURED PROPERTIES *

Property	Value	Test Method
Refractive Index (20°C)	1.50	ASTM D542
Boiling Water Absorption, % (2 h)	5.1	ASTM D570
Water Absorption, % (25°C, 24 h)	3.0	ASTM D570
Linear Shrinkage, %	1.2	ASTM D2566
See-Cure Cured Appearance	Colorless	N/A

ELECTRICAL PROPERTIES *

Property	Value	Test Method
Dielectric Constant (1 MHz)	5.85	ASTM D150
Dissipation Factor (1 MHz)	0.07	ASTM D150
Dielectric Breakdown Voltage, kV/mm [V/mil]	24 [610]	ASTM D149
Volume Resistivity, ohm-cm	1.42 x 10 ¹⁴	ASTM D257
Surface Resistivity, ohm	4.63 x 10 ¹⁴	ASTM D257

DISPENSE EQUIPMENT RECOMMENDATIONS *

Application	Manual	Semi-Automated	Fully Automated
Dots/Beads	SD-100	Model 400 Valve	eco-PEN450

ADHESION

Substrate	Recommendation
Leadframe	✓
Ceramic	✓
PCB	✓
Silicon	✓

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

* Not Specifications

N/A Not Applicable

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CURING EQUIPMENT RECOMMENDATIONS *			
Process Method	Spot Lamp	Flood Lamp	Conveyor
Broad Spectrum	BlueWave® 200	5000-ECE	UVCS Conveyor with 5000-EC or Fusion F300

SEE-CURE CURE GUIDELINES

The vivid blue color of this adhesive transitions to colorless when fully cured. The charts below provide information on cure time required to transition from blue to colorless using different light sources and adhesive thicknesses. Cure rate is dependent upon many variables including lamp intensity, distance from the light source, and required depth of cure. The times and belt speed for the transition listed below are based on lab results and are intended for reference only.

Dymax Curing System (Intensity)	5000-EC (200 mW/cm ²) ^A
Adhesive Thickness, mm [mil]	Time to complete transition, s ^A
0.10 [4.0]	10 s
0.41 [16]	15 s
1.6 [64]	18 s
6.5 [260]	32 s

Dymax Curing System (Intensity)	BlueWave® 200 (10.0 W/cm ²) ^B
Adhesive Thickness, mm [mil]	Time to complete transition, s ^A
0.10 [4.0]	3 s
0.41 [16]	4 s
1.6 [64]	5 s
6.5 [260]	10 s

Dymax Curing System (Intensity)	UVCS Conveyor with Fusion F300 (2.5 W/cm ²) ^D
Adhesive Thickness, mm [mil]	Belt speed to complete transition, m/min [ft/min] ^A
0.10 [4.0]	7.5 [24.6]
0.41 [16]	6 [19.7]
1.6 [64]	5 [16.4]
6.5 [260]	2 [6.6]

^A Curing through light-blocking substrates may limit the ability of See-Cure adhesives to transition from blue to colorless and may require additional time and/or intensity. These times/speeds are typical for curing through 100% UV and Visible light-transmitting substrates.

^B Intensity was measured over the UVA range (320-395 nm) using a Dymax ACCU-CAL™ 50 Radiometer at the cure surface.

^C Intensity was measured over the UVA/Visible range (350-450 nm) using a Dymax ACCU-CAL™ 50-LED Radiometer at the cure surface.

^D At 53 mm [2.1 in] focal distance. Maximum speed of conveyor is 8.2 m/min [27 ft/min]. Intensity was measured over the UVA range (320-395 nm) using the Dymax ACCU-CAL™ 160 Radiometer.

Full cure is best determined empirically by curing at different times and intensities, and measuring the corresponding change in cured properties such as tackiness, adhesion, hardness, etc. Full cure is defined as the point at which more light exposure no longer improves cured properties.

Dymax recommends that customers employ a safety factor by curing longer and/or at higher intensities than required for full cure. Although Dymax Application Engineering can provide technical support and assist with process development, each customer must ultimately determine and qualify the appropriate curing parameters required for their unique application.



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 surfaces in contact with the material should be clean and free from flux residue, 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, thickness, and percent light transmission of components between the material and light source.
4. Oxygen in the atmosphere may inhibit surface cure. Surfaces exposed to air may require high-intensity ($>100 \text{ mW/cm}^2$) UV light to produce a dry surface cure. Flooding the curing 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 or electrical testing.
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 any 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

This material may be dispensed with a variety of manual, semi-automated, and fully automated fluid delivery systems. Dymax has several dispensing systems that may be suitable for use with this material including hand-held dispensers such as our SD-100 syringe dispenser and Model 400 needle valve systems. These valve systems can be used in manual, semi-automated, or fully automated applications. Actual dispensing options vary by material properties. Questions relating to and defining the best fluid delivery system and curing equipment for specific applications should be discussed with the Dymax Application Engineering Team.

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.

CLEAN UP

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.



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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CONTACT DYMAYX

www.dymax.com

Americas

USA | +1.860.482.1010 | info@dymax.com

Europe

Germany | +49 611.962.7900 | info_de@dymax.com

Ireland | +353 21.237.3016 | info_ie@dymax.com

Asia

Singapore | +65.67522887 | info_ap@dymax.com

Shanghai | +86.21.37285759 | dymaxasia@dymax.com

Shenzhen | +86.755.83485759 | dymaxasia@dymax.com

Hong Kong | +852.2460.7038 | dymaxasia@dymax.com

Korea | +82.31.608.3434 | info_kr@dymax.com