9201-W

Wearable Friendly IBOA-Free Light/Moisture-Cure Encapsulant

APPLICATIONS

- Chip on Board, Chip on Flex, or Wire Bond Encapsulation
- Selective Protection of Components from Chemical or Environmental Exposures
- Ideal for End Items Such as Fitness Trackers, Smart Watches, Ear Buds, Headphones, Smart Glasses, and AR/VR Headsets

FEATURES

- UV/Visible Light Cure
- Secondary Moisture Cure
- High Thixotropic Index
- Moisture, Thermal, and Impact Resistance

OTHER FEATURES

- Polyimide (Kapton)
- FR4

Dymax 9201-W is an IBOA free, resilient, encapsulant material designed with a UV/Visible light and secondary ambient moisture-cure system, making it ideal for wearable applications where shadow areas are present. Unlike traditional electronics materials, these are designed with skin sensitivity and/or skin proximity in mind. This is especially important when the device cannot be hermetically sealed or based on restricted substance requirements. Dymax 9201-W is formulated to cure in shadow areas over time with ambient moisture. Dymax dual-cure materials contain no nonreactive solvents and cure upon exposure to light and moisture. Their ability to UV cure tack free 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, supplemented by a secondary moisture cure, they deliver high performance for encapsulation requirements. 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	Translucent Gel	N/A
Soluble in	Organic Solvents	N/A
Density, g/ml	0.98	ASTM D1875
Viscosity, cP	32,000 (nominal)	DSTM 502‡
Shelf Life at Recommended Conditions from Date of Manufacture	10 months	N/A

CURED MECHANICAL PROPERTIES ¥

Property	Value	Test Method
Durometer Hardness	D14-D40	ASTM D2240
Tensile at Break, MPa [psi]	11.1 [1614]	ASTM D638
Elongation at Break, %	178	ASTM D638
Modulus of Elasticity, MPa [psi]	322 [46,790]	ASTM D638
Glass Transition Tg, °C	74	ASTM D5418
CTEα_1, µm/m/°C	125	ASTM E831
CTEα_2, µm/m/°C	189	ASTM E831

OTHER CURED PROPERTIES ¥

Property	Value	Test Method
Water Absorption, % (25°C, 24 h)	0.13	ASTM D570
Boiling Water Absorption, % (2 h)	0.19	ASTM D570
Linear Shrinkage, %	1.1	ASTM D2566
Refractive Index (20°C)	1.5	ASTM D542

ELECTRICAL PROPERTIES ¥

Property	Value	Test Method
Dielectric Constant (1 MHz)	3.08	ASTM D150
Dielectric Strength, V/mil	761.4	ASTM D149
Volume Resistivity, ohm-cm	1.85e+15	ASTM D257

ADHESION

Substrate	Recommendation
ABS (acrylonitrile-butadiene-styrene)	✓
FR4	✓
PA (polyamide)	✓
PI (polyimide)	✓
PET poly(ethylene terephthalate)	✓
TPU (thermoplastic polyurethane)	✓

✓ Recommended o Limited Applications

st Requires Surface Treatment (e.g. plasma, corona treatment, etc.)

* Not Specifications

N/A Not Applicable

‡ DSTM Refers to Dymax Standard Test Method

¥ Measured after UV cure followed by 15 days at 25°C/50% RH

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CURING GUIDELINES

UV-curing guidelines for 9201-W at 1.00 mm (0.040 in) thickness:

Dymax Curing System (Intensity)	Recommended UV Dosage
5000-EC (200-225 mW/cm^2)[A]	3500 mJ/cm^2

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

SECONDARY MOISTURE CURE

A combination of light and moisture cure is required to achieve full cured mechanical properties. Moisture is also used as a secondary cure mechanism for shadow areas that cannot be cured with light. While moisture cure time in shadow areas is typically 2-3 days at 25°C [77°F], 50% RH, actual moisture-cure time is application specific and may vary. For material that has been light cured, typical full property development is after 7 days at 25°C [77°F], 50% RH.

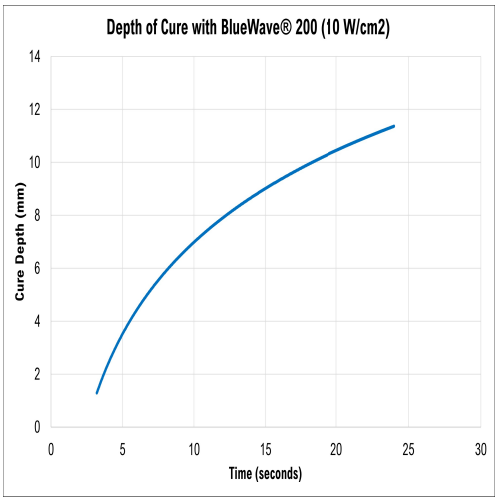
Cure time for both light cured and shadow areas depends on humidity level, amount of material in shadow areas, and its proximity to humidity. Material entrapped under large components may have a prolonged cure time. Exposure to heat (typically 40°C-60°C) and higher relative humidity will accelerate cure.

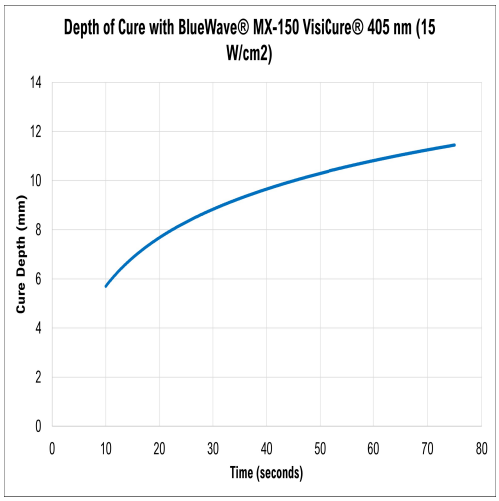
Full cure is best determined empirically by curing at different times and intensities, and measuring the corresponding change in cured properties such as tackiness, adhesion, hardness, etc. Full cure is defined as the point at which more light exposure no longer improves cured properties.

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.

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.





OPTIMIZING PERFORMANCE AND HANDLING

1. This product cures with exposure to UV and visible light as well as moisture. Exposure to ambient and artificial light and moisture 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 adhesive.
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 adhesive 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.
9. Resealing opened container under a dry, inert gas, such as nitrogen, can help to prolong the shelf life.
10. Light cure is recommended prior to moisture cure. Full cure develops after both light and moisture cure, not one or the other.

DISPENSING SUPPORT

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 low humidity, cool, and dark place when not in use. This product may polymerize upon prolonged exposure to ambient and artificial light as well as moisture. This material shelf life noted on page 1 of this document, when stored between 1°C (33°F) and 5°C (41°F) in the original, unopened container. Resealing large containers under dry inert gas, such as nitrogen, can help maintain the shelf life. Smaller syringes and cartridges should be kept in moisture barrier bags with desiccant when not in use.

CLEANUP

Uncured Dymax dual-cure materials may be removed from dispensing components and parts with non-alcoholic solvents. Alcoholic solvents (such as IPA or ethanol) that contain moisture activate the curing process. Therefore, it is recommended that non-alcohols such as Butyl Acetate, Acetone, or MEK be used to clean up uncured material and purge wetted dispensing lines. 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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