Dual-Cure 9014

UV Moisture Curing, Room-Temperature Stable Encapsulant

APPLICATIONS

- Chip on Board
- Chip on Flex
- Chip on Glass
- Wire Bonding

FEATURES

- UV Light Cure
- Secondary Moisture Cure Capability
- Flexible Encapsulant
- Shadow Area Performance
- Blue Fluorescing

RECOMMENDED SURFACES

- FR4
- Kapton
- Glass

Dymax dual-cure 9014 is formulated to cure primarily with UV light and includes a secondary moisture curing function for applications where shadow areas exist. Dymax dual-cure materials contain no nonreactive solvents. 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 for encapsulation. 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	Light Yellow Translucent Gel	N/A
Soluble in	Organic Solvents	N/A
Density, g/ml	1.02	ASTM D1875
Viscosity, cP	18,000 (nominal)	ASTM D2556
Shelf Life at Recommended Conditions from Date of Manufacture	7 months	N/A

CURED MECHANICAL PROPERTIES ¥

Property	Value	Test Method
Durometer Hardness (UV Only)	A70	ASTM D2240
Durometer Hardness	D51	ASTM D2240
Elongation at Break, %	63	ASTM D638
Tensile at Break, MPa [psi]	8.2 [1,200]	ASTM D638
Modulus of Elasticity, MPa [psi]	119 [17,300]	ASTM D638
CTEα_1, µm/m/°C	107	ASTM E831
CTEα_2, µm/m/°C	192	ASTM E831

OTHER CURED PROPERTIES ¥

Property	Value	Test Method
Refractive Index (20°C)	1.50	ASTM D542
Boiling Water Absorption, % (2 h)	1.8	ASTM D570
Water Absorption, % (25°C, 24 h)	0.6	ASTM D570
Linear Shrinkage, %	1.8	ASTM D2566
Glass Transition Tg, °C	51	ASTM D5418

ELECTRICAL PROPERTIES ¥

Property	Value	Test Method
Dielectric Constant (1 MHz)	4.92	ASTM D150
Dissipation Factor (1 MHz)	0.023	ASTM D150
Dielectric Breakdown Voltage, kV/mm [V/mil]	40 [1020]	ASTM D149
Volume Resistivity, ohm-cm	9.70E+13	ASTM D257
Surface Resistivity, ohm	3.50E+13	ASTM D257

ADHESION

Substrate	Recommendation
FR4	✔
Kapton	✔
Glass	✔

✔ Recommended o Limited Applications

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

* Not Specifications

N/A Not Applicable

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

Technical Data Collected 12/2018 Rev.02/10/2023

CURING GUIDELINES

Recommended application thickness is up to 2.5 mm (0.10 in). Recommended light curing below:

Recommended Light Curing System (Intensity)	Belt Speed
UVCS Conveyor with Fusion F300S (2.5 W/cm^2)[A]	1.5 m/min [5 ft/min]

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

RECOMMENDED MOISTURE CURE (AFTER LIGHT CURING)

7 days at 25°C, 50% RH or
2 days at 40°C, 50% RH

A combination of light and moisture cure is required to achieve full cured mechanical properties.

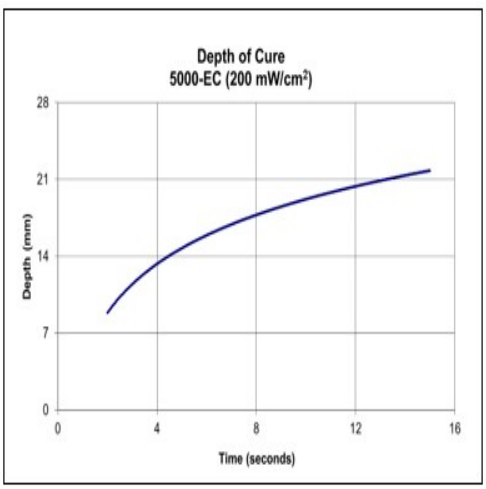
Moisture is also used as a secondary cure mechanism for shadow areas that cannot be cured with light. While moisture cure time in shadow areas is typically 2-3 days at 25°C [77°F], 50% RH, actual moisture cure time is application specific and may vary. For adhesive that has been light cured, typical 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 coating in shadow areas, and proximity of shadow coating to humidity. Coating 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. Accelerated moisture cure time is also dependent on the variables listed above.

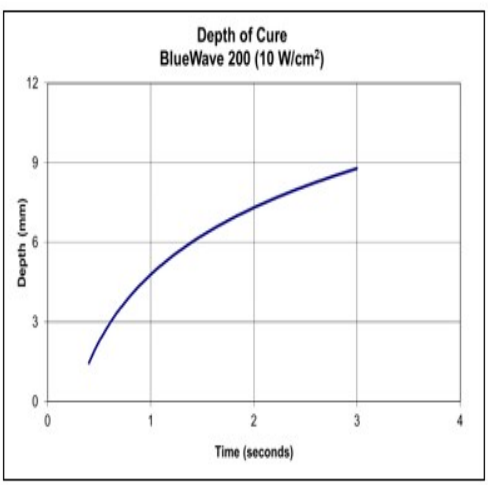
Full cure is best determined empirically by curing at different times and intensities, and measuring the corresponding change in cured properties such as tackiness, adhesion, hardness, etc. Full cure is defined as the point at which more light and/or ambient exposure no longer improves cured properties.

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 10°C (50°F) and 25°C (77°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 cleanup 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.

The data provided in this document are based on historical testing that Dymax performed under laboratory conditions as they existed at that time and are for informational purposes only. The data are neither specifications nor guarantees of future performance in a particular application. Dymax does not guarantee that this product's properties are suitable for the user's intended purpose.

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