



## Manufacturer:

Dymax

## Product Name:

Dymax OP-83-LS Low Shrinkage Epoxy, Off White Opaque to Charcoal Translucent Gel, Hybrid UV, LED & Heat Cure - 10ml Syringe

## Manufacturer Part Number:

OP-83-LS-10ML



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### OP-83-LS

#### Low-Shrinkage Camera Module Epoxy with LED and Heat-Cure Capability

| APPLICATIONS                                                                                                                  | FEATURES                                                                                                                                                                                                                                                              | RECOMMENDED SURFACES                                                                                              |
|-------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>Active Alignment</li><li>Optical Assembly</li><li>Camera Module/LiDAR Bonding</li></ul> | <ul style="list-style-type: none"><li>Very Fast UV/Visible Light Cure</li><li>Low-Temperature (80-85°C) Heat-Cure Capability</li><li>Moisture and Thermal Cycle Resistant</li><li>One Component, No Mixing Required</li><li>Cold Ship/Cold Storage at 1-5°C</li></ul> | <ul style="list-style-type: none"><li>LCP</li><li>PCB</li><li>PPS</li><li>FPC</li><li>Metallic Surfaces</li></ul> |

Dymax OP-83-LS is a very low shrinkage, fast curing UV/Visible light-curable epoxy with superior adhesion for camera modules. OP-83-LS is especially formulated to cure primarily with UV light and includes a low-temperature heat-curing function in applications where shadow areas exist or where heat-only curing is preferred. Dymax 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 camera module assembly. Dymax lamps offer the ideal balance of UV and visible light for the fastest, deepest cures. This product requires cold store and cold shipping and should be kept between 1°C [34°F] and 5°C [41°F] in the original, unopened container. This product is in full compliance with RoHS directives 2015/863/EU.

| UNCURED PROPERTIES *                                          |                                              |             | OTHER CURED PROPERTIES *              |                |             |
|---------------------------------------------------------------|----------------------------------------------|-------------|---------------------------------------|----------------|-------------|
| Property                                                      | Value                                        | Test Method | Property                              | Value          | Test Method |
| Solvent Content                                               | No Nonreactive Solvents                      | N/A         | Boiling Water Absorption, % (2 h)     | 0.47           | ASTM D570   |
| Solvent Content                                               | No Nonreactive Solvents                      | N/A         | Water Absorption, % (25°C, 24 h)      | 0.13           | ASTM D570   |
| Chemical Class                                                | Epoxy                                        | N/A         | Volumetric Shrinkage, %               | 1.1            | DSTM 6114†  |
| Appearance                                                    | Off White Opaque to Charcoal Translucent Gel | N/A         | Glass Transition Tg, °C               | 184            | ASTM D5418  |
| Soluble in                                                    | Organic Solvents                             | N/A         | CTEα1, µm/m/°C                        | 31             | ASTM E831   |
| Density, g/ml                                                 | 1.6                                          | ASTM D1875  | CTEα2, µm/m/°C                        | 77             | ASTM E831   |
| Viscosity, cP                                                 | 86,000 (nominal)                             | DSTM 502‡   | ADHESION                              |                |             |
| Thixotropic Ratio                                             | 6.5                                          | DSTM 502‡   | Substrate                             | Recommendation |             |
| Shelf Life at Recommended Conditions from Date of Manufacture | 7 months                                     | N/A         | ABS (acrylonitrile-butadiene-styrene) | ✓              |             |
| CURED MECHANICAL PROPERTIES *                                 |                                              |             | Aluminum                              | ✓              |             |
| Property                                                      | Value                                        | Test Method | CAP (cellulose acetate propionate)    | ✓              |             |
| Durometer Hardness                                            | D94                                          | ASTM D2240  | FR-4 Board                            | ✓              |             |
| Tensile at Break, MPa [psi]                                   | 36.7 [5,328]                                 | ASTM D638   | Glass                                 | ✓              |             |
| Elongation at Break, %                                        | 1.2                                          | ASTM D638   | LCP (liquid-crystal polymer)          | ✓              |             |
| Modulus of Elasticity, MPa [psi]                              | 3983 [578,000]                               | ASTM D638   | Magnesium                             | ✓              |             |
|                                                               |                                              |             | PC (polycarbonate)                    | ✓              |             |
|                                                               |                                              |             | PET (poly(ethylene terephthalate))    | ✓              |             |
|                                                               |                                              |             | PPS (polyphenylene sulfide)           | ✓              |             |
|                                                               |                                              |             | PS (polystyrene)                      | ✓              |             |
|                                                               |                                              |             | Stainless Steel                       | ✓              |             |

\* Not Specifications

N/A Not Applicable

‡ DSTM Refers to Dymax Standard Test Method

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Technical Data Collected 01/30/2021 Rev 02/08/2024



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**ELECTRONIC ASSEMBLY MATERIALS****OP-83-LS Product Data Sheet****CURING GUIDELINES**

Fixture time is defined as the time to develop a shear strength of 0.1 N/mm<sup>2</sup> [10 psi] between glass slides. Actual cure time typically is 3-to-5 times fixture time.

| Dymax Curing System (Intensity)                                              | Fixture Time or Belt Speed <sup>A</sup> |
|------------------------------------------------------------------------------|-----------------------------------------|
| 5000-EC (200 mW/cm <sup>2</sup> ) <sup>B</sup>                               | 1 s                                     |
| BlueWave® 200 (10 W/cm <sup>2</sup> ) <sup>B</sup>                           | 0.2 s                                   |
| BlueWave® LED Flood RediCure® 365 nm (450 mW/cm <sup>2</sup> ) <sup>C</sup>  | 0.2 s                                   |
| BlueWave® LED Flood PrimeCure® 385 nm (850 mW/cm <sup>2</sup> ) <sup>C</sup> | 0.2 s                                   |
| BlueWave® LED Flood VisiCure® 405 nm (950 mW/cm <sup>2</sup> ) <sup>C</sup>  | 0.2 s                                   |
| UVCS Conveyor with Fusion F300S (2.5 W/cm <sup>2</sup> ) <sup>D</sup>        | 8 m/min [27 ft/min]                     |

<sup>A</sup> Fixture times/belt speeds are typical for curing thin films through 100% UV and light-transmitting substrates. Light-obstructing substrates may require longer cure times.

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

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

<sup>D</sup> 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.

Higher intensity for shorter time is preferred for curing this product (500 mW/cm<sup>2</sup>+ recommended for most applications).

**HEAT CURE**

Heat can be used as the sole cure mechanism or in conjunction with light curing. The following heat-cure schedule may be used\*

80°C [176°F] 30-35 minutes

85°C [185°F] 20-25 minutes

\*Note: Actual heat-cure time may vary due to part configuration, volume of adhesive applied, and oven efficiency.

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 or heat no longer improves cured properties. Higher intensities or longer cures (up to 5x) generally will not degrade Dymax light-curable adhesives.

Dymax recommends that customers employ a safety factor by curing longer and/or at higher intensities than required for full cure.

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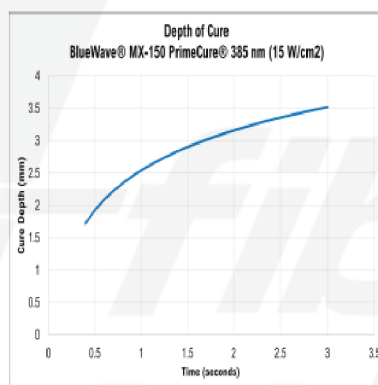
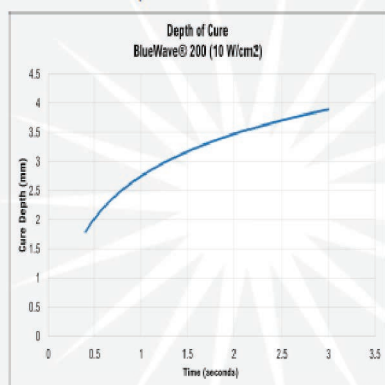
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**ELECTRONIC ASSEMBLY MATERIALS  
OP-83-LS Product Data Sheet****DEPTH OF CURE**

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. 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 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. High humidity environments or basic materials may inhibit cure.
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.

**DISPENSING SUPPORT**

Material should be allowed to reach room temperature prior to use. This may take approximately 20-60 minutes depending on the package size being used. Due to the filler in this material, 25-gauge (ID 0.25 mm or 0.010") is the smallest recommended tip size in order to eliminate potential clogging issues.

**STORAGE AND SHELF LIFE**

Store the covered material in a cool, dark place when not in use. This product may polymerize upon prolonged exposure to ambient and artificial light as well as ambient temperatures. This material shelf life noted on page 1 of this document, when stored between 1°C (34°F) and 5°C (41°F) in the original, unopened container.

The pot life is 5 days at 25°C. In a production setting, once material is removed from 1-5°C storage, it should be used in its entirety or be disposed of within 5 days.

**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.

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**ELECTRONIC ASSEMBLY MATERIALS****OP-83-LS Product Data Sheet****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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