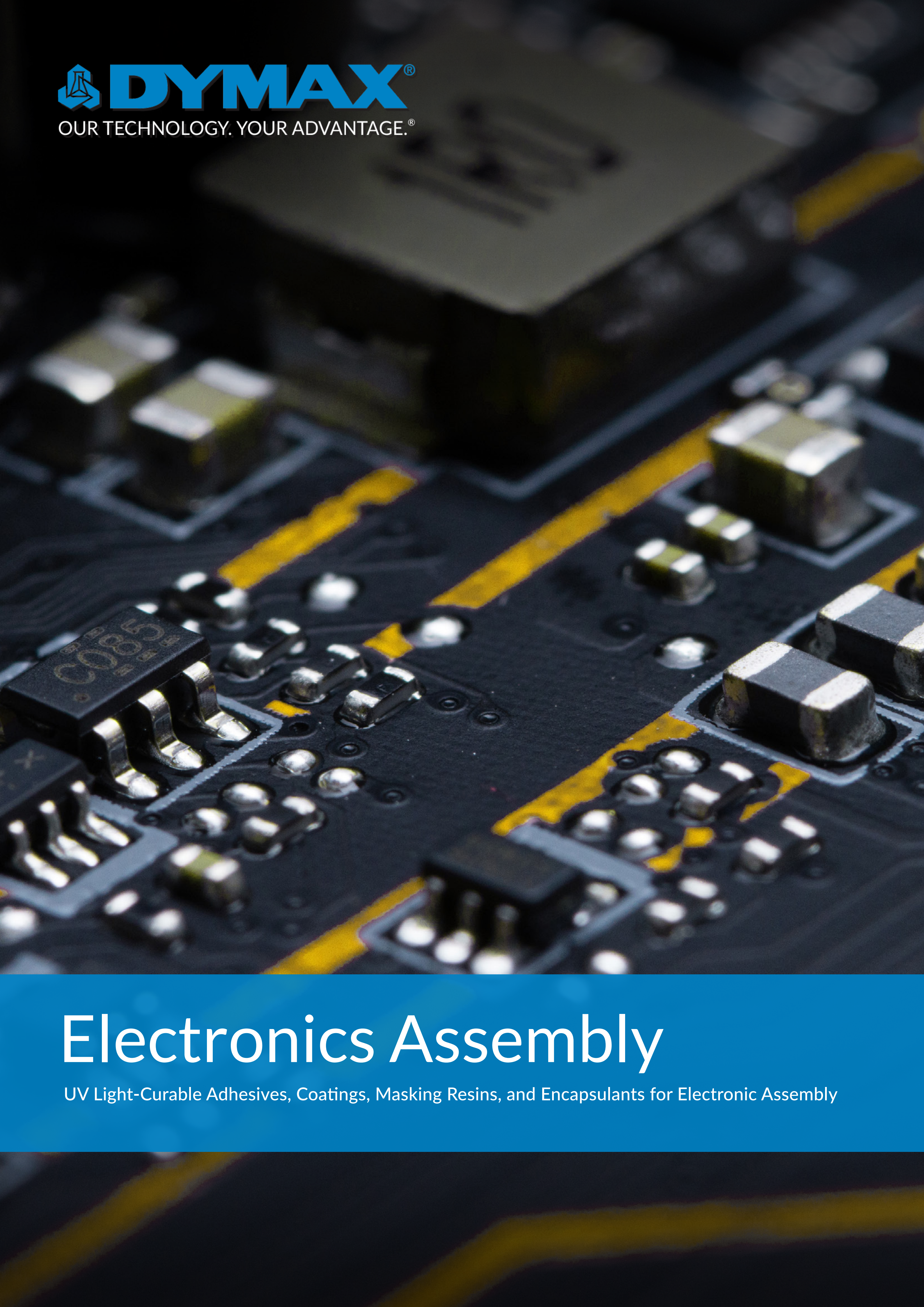
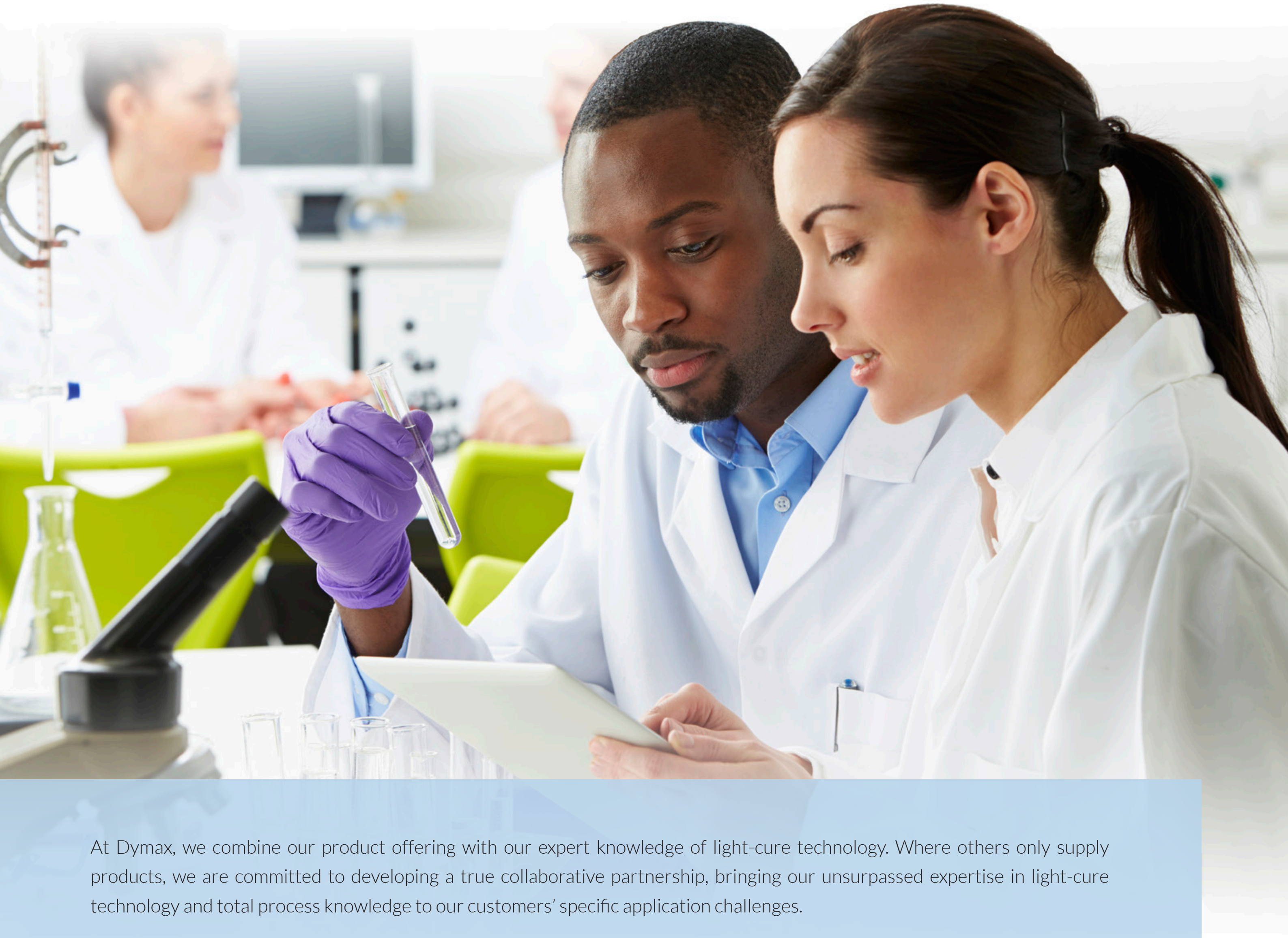
DYMAX®
OUR TECHNOLOGY. YOUR ADVANTAGE.®



Electronics Assembly

UV Light-Curable Adhesives, Coatings, Masking Resins, and Encapsulants for Electronic Assembly

Our Technology.
Your Advantage.®



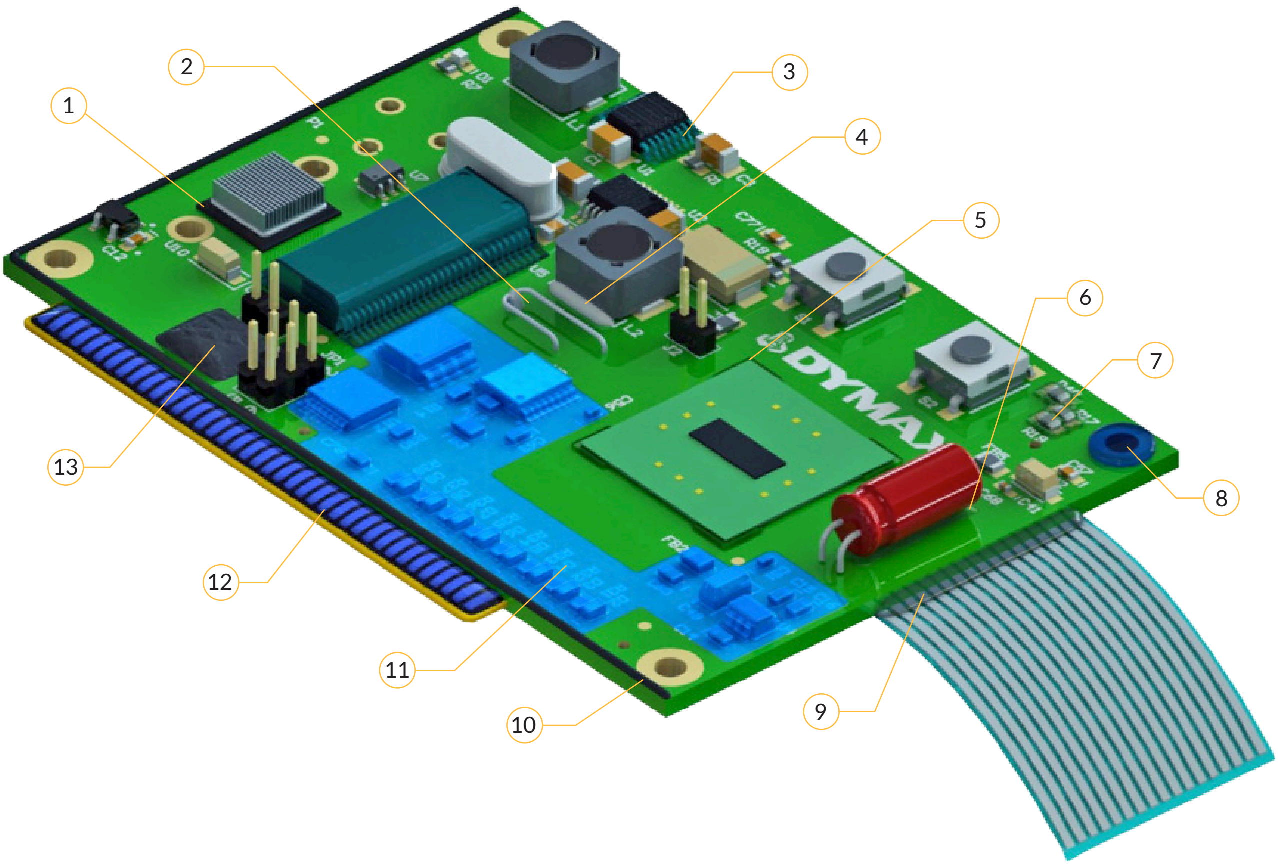
At Dymax, we combine our product offering with our expert knowledge of light-cure technology. Where others only supply products, we are committed to developing a true collaborative partnership, bringing our unsurpassed expertise in light-cure technology and total process knowledge to our customers' specific application challenges.

Because we understand the process as a whole, we can offer our customers a solution where chemistry and equipment work seamlessly together with maximum efficiency. Our application engineering team works side-by-side with our customers, providing assistance with product and process design, equipment selection and integration, testing, evaluation, and pre-production trials throughout the life of the assembly process. Our laboratory is fully equipped to perform mechanical testing under a variety of environmental conditions including shear strength, adhesion strength between substrates, compression set, and humidity aging per ASTM standards. The lab also has a variety of curing equipment and manual and automated dispensing systems for evaluation.

Our assembly solutions and expertise give manufacturers the knowledge and tools to increase productivity, lower costs, increase safety, and achieve a more efficient manufacturing process. That's a competitive advantage they can't get anywhere else.

Dymax Light-Curable Materials
for Electronics Assembly

Dymax offers a broad range of light-curable materials for use in circuit protection and electronic assembly applications. These materials cure in seconds for faster processing and higher throughput and are available with many innovative and patented technologies that turn problems like shadow areas, cure confirmation, and difficult inspection into non-issues. The materials are electrically insulating, making them a perfect fit for conformal coating, encapsulation, bonding, thermal management, masking, and many other electronic assembly processes. Dymax light-curable materials are also solvent free and one-part, requiring no mixing or prep before application. Most products are available in multiple-viscosity grades, so the material flow may be tailored to the individual application. IPC approved, MIL-I-46058C and UL listed self-extinguishing grades are available.



1. Thermal Interface
2. Wire Tacking
3. Encapsulation
4. Staking
5. Ruggedization/ Cornerbond
6. Reinforcement
7. Encapsulation
8. Masking
9. Strain Relief
10. Cure-In-Place Gasket
11. Conformal Coating
12. Peelable Mask
13. Glob Top Encapsulant

Environmental Benefits

of Dymax Light-Curable Materials

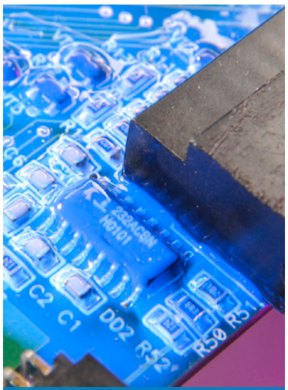
Dymax understands that safe, ecologically friendly products benefit our customers, the environment, and us. We have created materials that minimize ecological impact. These attributes include:

- Solvent-free materials
- Halogen-free materials
- RoHS compliance
- REACH - no substance of very high concern (SVHC)
- Eco-friendly, one-component materials

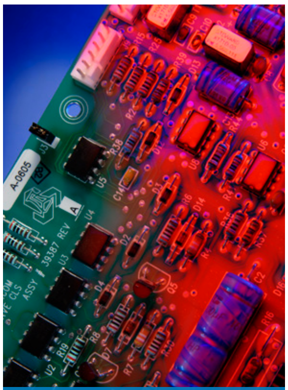
Dymax Halogen-Free conformal coatings, encapsulants, and adhesives are documented by an independent laboratory to meet or exceed standards set forth in IEC 61249-2-21. This international directive defines halogen-free as <900 ppm for chlorine, <900 ppm for bromine and <1,500 ppm total level of both combined. The current test method used for certification is BS EN 14582:2007.

Conformal Coatings

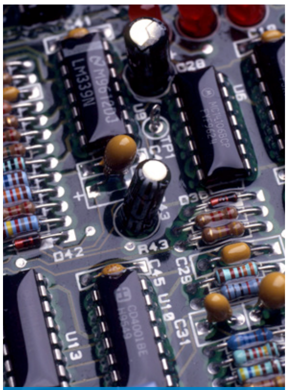
Reliable Board Protection in Seconds



Blue Fluorescing Coatings



Ultra-Red® Fluorescing Coatings



Coatings with Secondary Heat or Moisture Cure

KEY ATTRIBUTES

- **Solvent free**
- **Adhesion to flex circuit substrates (FPC)**
- **Tack-free UV cures in seconds**
- **Low stress under thermal cycling**
- **Excellent environmental resistance**
- **Rigid and flexible coatings available**
- **Black grades available**
- **Variety of available viscosities**

Product Number*	Description	Nominal Viscosity (cP)	Durometer Hardness	Modulus of Elasticity, MPa [psi]	Dielectric Strength, Volts/mil	Approvals	Halogen Free?
9-20351-UR	• Easy one-pass coverage of high-profile leads and tall components without seeping into shadow areas • Secondary heat cure for shadow areas	13,500	D60	30.3 [4,400]	500	–	HF HALOGEN FREE
9-20557	• Medium viscosity for wetting components • Low modulus for thermal cycling performance • Secondary heat cure for shadow areas	2,300	D60	37.9 [5,500]	>1,500	MIL-I-46058C listed IPC-CC-830 approved UL 94V-1	HF HALOGEN FREE
9-20557-LV	• Low viscosity for thin coatings • Low modulus for enhanced thermal cycling performance • Secondary heat cure for shadow areas	850	D70	310 [45,000]	>1,500	MIL-I-46058C listed IPC-CC-830 approved	HF HALOGEN FREE
984-LVUF	• Rigid for high chemical and abrasion resistance • Secondary heat cure for shadow areas	160	D85	724 [105,100]	1,800	MIL-I-46058 listed IPC-CC-830 approved UL 94V-0	HF HALOGEN FREE
987	• High chemical and abrasion resistance • Secondary heat cure for shadow areas	150	D85	900 [130,000]	>1,500	MIL-I-46058 listed IPC-CC-830 approved	HF HALOGEN FREE
9451	• True black coating ideal for covering sensitive information • Secondary heat cure for shadow areas • Optimized for single pass coating	6,000	–	717 [104,000]	1,200	UL 94V-0	HF HALOGEN FREE
9452-FC	• Extremely low viscosity for film/flow coating applications • Very good thermal shock resistance • LED curable • Secondary heat cure for shadow areas • Blue fluorescing	20	D60	1,137 [165,000]	1,000	UL 94V-0**	HF HALOGEN FREE
9481-E	• Room-temperature secondary moisture cure for shadow areas • Highest chemical and abrasion resistance • Low viscosity for thin coatings	125	D75	150 [21,800]	>1,500	MIL-I-46058 listed IPC-CC-830 approved UL 94V-0 UL 746E	HF HALOGEN FREE
9482	• Room-temperature secondary moisture cure for shadow areas • Superior re-workability • Chemical and thermal shock resistance	1,100	D70	275 [40,000]	1,100	MIL-I-46058 listed IPC-CC-830 approved UL 94V-0 UL 746E	HF HALOGEN FREE

* Other grades are available for specific applications requiring physical properties different from standard products listed here.

** Testing performed internally at Dymax.

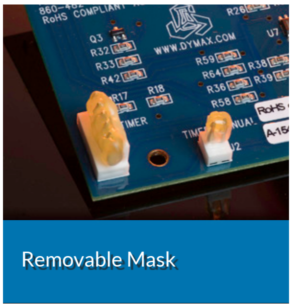
SpeedMask® Peelable Masks

Product Number	Description and Applications	Cure Depth,** mm [in]	Durometer Hardness	Cure Speed,* sec	Viscosity, cP	Halogen Free?
9-20479-B-REV-A	• Wave-solder resistant • Blue color for easy visual inspection • Highly thixotropic for manual or automated dispensing	4.90 [0.19]	A70	1	150,000	HF HALOGEN FREE
9-318-F	• Wave-solder resistant • Fluoresces blue for easy inspection • Very fast curing	6.40 [0.25]	A55	<4	50,000	HF HALOGEN FREE
9-7001	• Wave-solder resistant • Visible pink color in uncured state • Lower shrinkage	8.36 [0.33]	A70	1	40,000	HF HALOGEN FREE

* Cure speed depends on the intensity and distance from the light source. Cure speed was measured at an intensity of 175 mW/cm^2.

** 5 second cure


Fluorescing Mask


Removable Mask


Peelable Mask

KEY ATTRIBUTES

- **100% solids**
- **Fluorescing and blue grades**
- **UV/Visible cure in seconds**
- **One part - no mixing**
- **No ionic contamination**

Wire Tacking Adhesives

Photocurable Technology Offers Lower Costs and Increased Productivity

Product Number	Description	Nominal Viscosity, cP	Durometer Hardness	Tensile at Break, MPa [psi]	Halogen Free?
9-911-REV-B	• On-demand cure for optimal positioning • Exposed areas cure in seconds for immediate strength	25,000	D80	24 [3,500]	HF HALOGEN FREE


Wire Tacking

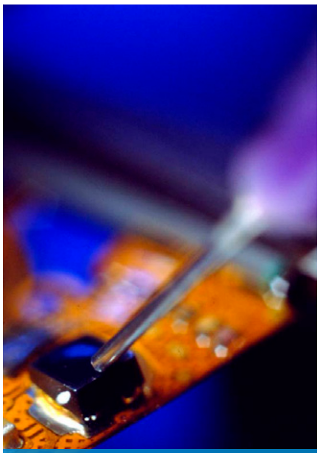
KEY ATTRIBUTES

- **Instant UV cure**
- **Fluorescing additive for in-line quality control**
- **One part - no mixing**
- **Excellent adhesion to solder masks and wires**
- **Solvent free**
- **Thermal shock, solvent, and moisture resistance**
- **Unlimited pot life**

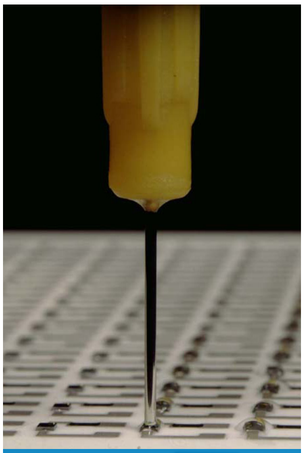
Chip Encapsulants and Wire Bonders

Superior Protection on Flexible and Rigid Platforms

Product Number	Description	Applications	Durometer Hardness	Nominal Viscosity, cP	Elongation at Break, %	Modulus of Elasticity, MPa [psi]	Halogen Free?
9001-E-V3.1	• UV/Visible light cure with secondary heat cure for shadow areas • Multiple viscosities available for optimal flow and coverage • Low modulus for wire bonding	• Chip-on-board • Chip-on-flex • Chip-on-glass • Wire bonding • Bare-die encapsulation	D45	4,500	500	17 [2,500]	HF HALOGEN FREE
9001-E-V3.5				17,000			
9008	• Flexible • Highly moisture-resistant bonds to diverse surfaces such as polyimide, DAP, glass, epoxy board, metal, PET • High adhesion, even at -40°C	• Chip-on-flex • Flex circuit bonding and attachment to PCB and glass	A85	4,500	300	45 [6,500]	HF HALOGEN FREE
9037-F	• UV/Visible light cure with secondary heat cure for shadow areas • Moisture and thermal resistance • Blue fluorescing	• Chip-on-board • Chip-on-flex • Chip-on-glass • Wire bonding	D42	51,234	173	10.7 [1,554]	HF HALOGEN FREE
9101	• UV/Visible light cure with secondary moisture cure for shadow areas • Flexible • Moisture and thermal resistance	• Chip-on-board • Chip-on-flex • Chip-on-glass • Wire bonding	D30-D50	7,000	38	17.5 [2,550]	HF HALOGEN FREE
9102				17,000	34	18.4 [2,670]	
9103				25,000	36	17.6 [2,560]	



Secondary Heat or Moisture Cure



Chip Encapsulants

Flex Circuit Encapsulants/ Wire Bonding

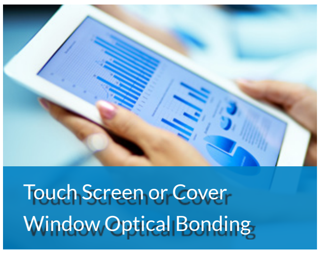
Black Encapsulants

KEY ATTRIBUTES

- **100% solvent free**
- **Low stress under thermal cycling**
- **Instant UV/Visible cures**
- **Electrically insulating**
- **High ionic purity**
- **Room-temperature storage**
- **Tenacious adhesion to flex circuit substrates (polyimide and PET)**
- **Thermal shock and moisture resistance**

Display Bonding and Laminating

Product Number	Description	Applications	Volumetric Shrinkage, %	Nominal Viscosity, cP	Halogen Free?
9701	• Excellent re-workability • Good thermal shock resistance • Low shrinkage • Non-yellowing	Optical display lamination and touch screen bonding	4.9	200	HF HALOGEN FREE
9702	• Excellent re-workability • Good thermal shock resistance • Low shrinkage • Non-yellowing	Optical display lamination and touch screen bonding	4.2	950	HF HALOGEN FREE
9703	• Excellent re-workability • Good thermal shock resistance • Low shrinkage • Non-yellowing	Optical display lamination and touch screen bonding	4.2	30,000	HF HALOGEN FREE


Touch Screen or Cover Window Optical Bonding

KEY ATTRIBUTES

- **One component, no mixing required**
- **Flexible**
- **Fast cure**
- **Bonds various substrates**
- **Resistant to yellowing**
- **High optical clarity**

Thermal Interface Adhesives

Efficient Thermal Transfer Between Heat Sinks and Electronics

Product Number	Description	Application	Thermal Conductivity	Nominal Viscosity, cP	Halogen Free?
9-20801	• Light cure in seconds • Secondary activator or heat cure for shadow areas* • Highly thixotropic for optimal placement	• Mounting heat sinks on PCBs • LED heat dissipation	0.9 W/m*K	110,000	HF HALOGEN FREE

**Dymax 501-E is the recommended activator for shadowed areas*


Bonding Heat Sinks

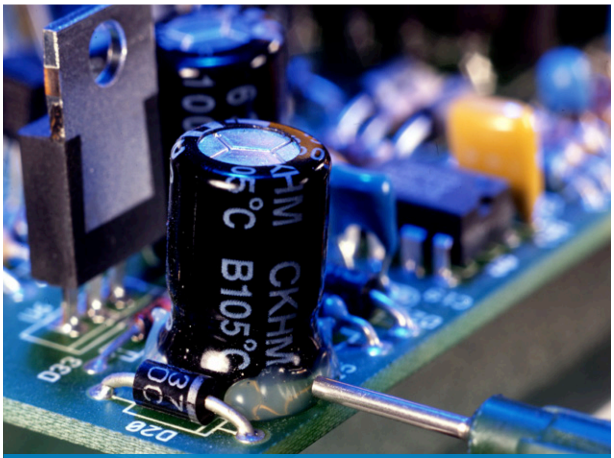
KEY ATTRIBUTES

- **Sets in seconds with light exposure**
- **Low stress for mismatched CTE's**
- **Cure shadow areas with activator or heat**
- **Room-temperature storage and cure**
- **High-strength bonds**

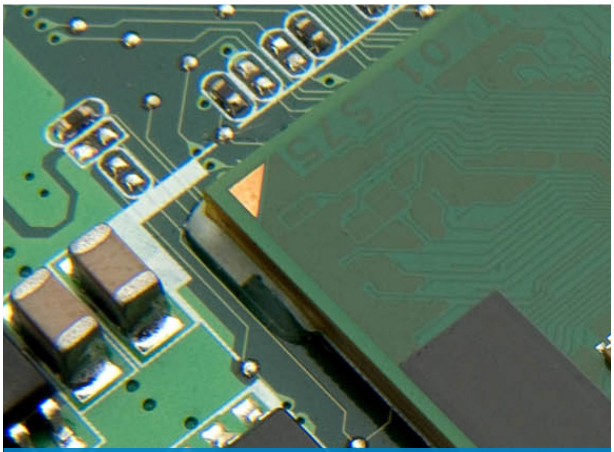
Ruggedizing/Edgebond Materials for BGAs & VGAs

Photocurable Technology Offers Lower Costs and Increased Productivity

Product Number	Description and Applications	Nominal Viscosity, cP	Durometer Hardness	Tensile at Break, MPa [psi]	Cure Depth, mm [in]	Halogen Free?
9309-SC	• Highly thixotropic • Formulated with See-Cure technology for easy visual confirmation of full cure	45,000	D57	22 [3,000]	6.5 [0.26]	HF HALOGEN FREE
9422-SC	• Highly thixotropic for optimal placement and wetting of components • Formulated with See-Cure technology for easy visual confirmation of full cure	38,000	D50	16 [2,300]	6.5 [0.26]	HF HALOGEN FREE



Ruggedizing



Leadless Component Edgebonding/Cornerbonding

KEY ATTRIBUTES

- **Fast dispense and cure**
- **Holds shape after dispense**
- **Simple visual inspection with See-Cure Technology**
- **Improved bond strength for die and pry testing**
- **Easy rework**
- **Reduce stress on interconnects during push, pull, shock, drop, and vibration**
- **Engineered bead shape for wetting both board surface and component edge without seeping into shadow area**
- **Jettable**

Potting and Sealing Materials

For Shallow Potting in 10-30 Seconds or Less – Highest Adhesion to Substrates

Product Number	Description and Applications	Recommended Substrates	UV Cure* Speed (sec)/ Depth (mm [in])	Durometer Hardness	Nominal Viscosity, cP	Halogen Free?
921-T	• Connectors, thermal switches • Tamper proofing • Translucent bonds with high adhesion	ABS, filled nylon, metal, glass	30/6.4 [0.25]	D75	3,500	HF HALOGEN FREE
921-VT					11,000	
921-GEL					25,000	
9001-E V3.1	• Sensors • Flexible • Excellent adhesion to engineering plastics	ABS, PC, PVC, FR-4, metals	15/6.4 [0.25]	D45	4,500	HF HALOGEN FREE
9001-E V3.5					17,000	
9037-F	• Secondary heat cure for shadow areas • Blue fluorescing • Flexible with good moisture and thermal resistance	FR-4, glass, kapton	TBD	D42	51,234	HF HALOGEN FREE

**UV cure speed depends on the intensity reaching the surface of the resin. Cure speed was measured at an intensity of 175 mW/cm^2.*


Cable Potting


Deep Layer Potting

KEY ATTRIBUTES

- **Full UV/Visible cure in seconds**
- **Solvent free**
- **High adhesion to substrates**
- **Flexible and rigid products available**

LED Encapsulating

Bonding, Potting, and Sealing in Seconds

Product Number	Description	Applications	Linear Shrinkage	Nominal Viscosity, cP	Halogen Free?
LIGHT-CAP® 9622	• UV/Visible light cure in seconds • No mixing required • Heat resistant to 100°C • Resistant to long-term UV exposure • High light transmittance • Durometer between silicone and epoxy	• Instant casting of LEDs • Rapid forming of protective optical lens	0.79 %	12,000	HF HALOGEN FREE

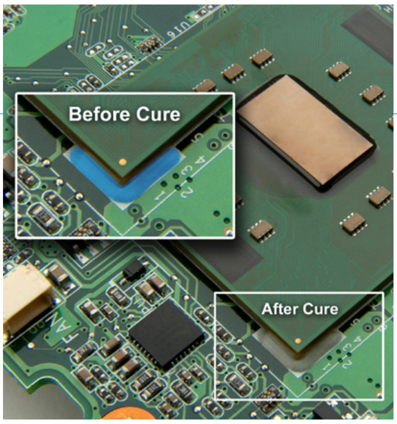

LED Airport Display


LED Light

KEY ATTRIBUTES

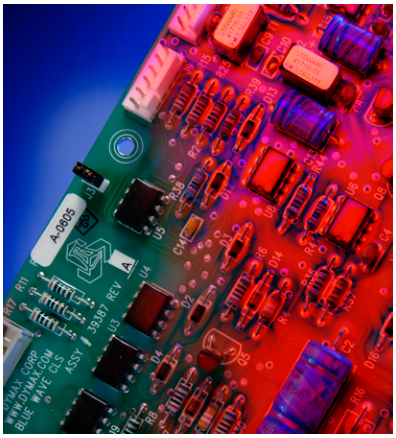
- **One component - no mixing required**
- **Enhances light transmittance**
- **Fast cure**
- **Solvent free**
- **Resistant to heat-induced yellowing**
- **Optically clear**

Dymax Adhesive Technologies



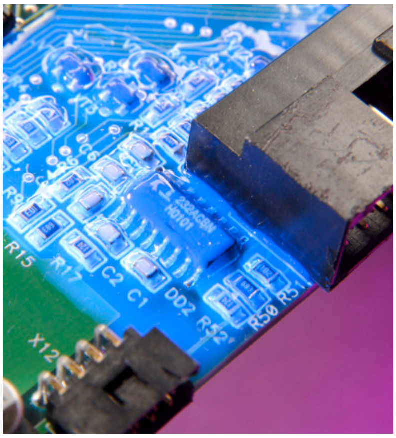
SEE-CURE TECHNOLOGY

Light-curable adhesives formulated with Dymax patented See-Cure technology have a built-in cure validation that makes it easy for operators or simple automated inspection equipment to confirm cure without investing in additional specialized equipment. See-Cure technology intentionally transitions the color of the adhesive after it has cured and builds a visible safety factor into the assembly process.



ULTRA-RED® FLUORESCING TECHNOLOGY

Dymax's patented Ultra-Red® fluorescing technology enhances bond-line inspection processes and product authentication. Adhesives formulated with Ultra-Red® remain clear until exposed to low-intensity UV light at which point they fluoresce bright red. This is particularly effective while bonding plastics that naturally fluoresce blue, such as PVC and PET. Ultra-Red® technology also produces a unique spectral signature that can be used by manufacturers for product authentication.



MULTI-CURE® LIGHT/HEAT-CURE TECHNOLOGY

Multi-Cure® adhesives combine the high-speed cure of UV or UV/Visible light with secondary cure mechanisms that enhance polymerization. Secondary cure mechanisms, which include thermal (heat) cure or activator cure, are useful when light can only reach a portion of the bond line, or when tacking a part prior to thermal cure to allow easier handling and transport during the manufacturing process.

DUAL-CURE LIGHT/MOISTURE-CURE TECHNOLOGY

Dual-Cure coatings are formulated to ensure complete cure in applications where shadow areas on high-density circuit boards are a concern. Previously, areas shadowed from light were managed by selective coating – eliminating the need to cure in shadow areas – or a secondary heat-cure process. Shadowed areas cure over time with moisture, eliminating the need for that second process step or concerns of component life degradation due to temperature exposure.

LED LIGHT-CURABLE ADHESIVES & COATINGS

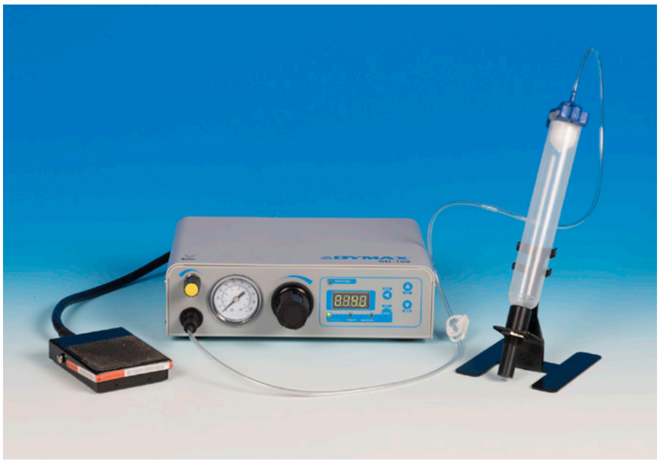
Dymax offers specially formulated LED light-curable adhesives and coatings for use with Dymax LED UV/Visible light-curing systems. The adhesives range from fast to ultra-fast cure speeds in order to accommodate specific electronic assembly needs.

Dispensing and Curing Equipment

for Electronic and Photonic Applications

DISPENSING SYSTEMS

Dymax has developed high-quality, field-proven dispense systems to fit many types of adhesive and fluid dispensing applications. These systems include various automated and manual dispensing valves, spray valves and guns, controllers, material reservoirs, and related components for seamless integration into assembly processes. The systems provide accurate, consistent dispense for a range of low- to high-viscosity fluids. Dispensing systems with adjustable suck-back control and dispensing valves that offer contaminate-free dispensing are available.



SD-100 DIGITAL SYRINGE DISPENSER

- **Precision control over the dispense of low- to high-viscosity materials**
- **Ideal for use as an operator work station or integrated into an automated process**

MODEL 400 HANDHELD NEEDLE VALVE DISPENSING SYSTEM

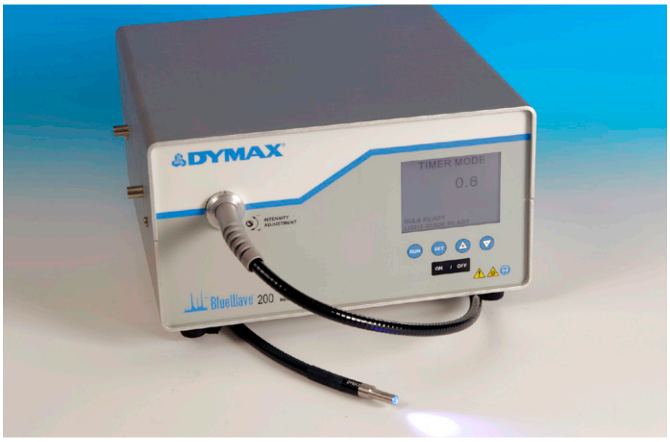
- **Designed for dispensing very precise dots or fine beads of low- to medium-viscosity materials**

LIGHT-CURING SYSTEMS

Dymax designs and manufactures a wide range of curing equipment including spot lamps, flood lamps, and conveyor systems, as well as radiometers and other accessories. Dymax systems are optimized to work with light-curable adhesives to gain process efficiencies by targeting rapid surface curing, depth of cure, and speed of cure, all while delivering light in a rapid and economical way. CE marked equipment is available.

SPOT LAMPS

Spot lamps provide a variety of methods to deliver light to a very precise location. They can be used manually by an operator or incorporated into a high-speed automated assembly line. Dymax offers multi-spectrum light-emitting lamps which use high-pressure mercury vapor bulbs, as well as light-emitting diode spot lamps, which use an array of surface-mounted LEDs instead of traditional metal halide or mercury bulbs.

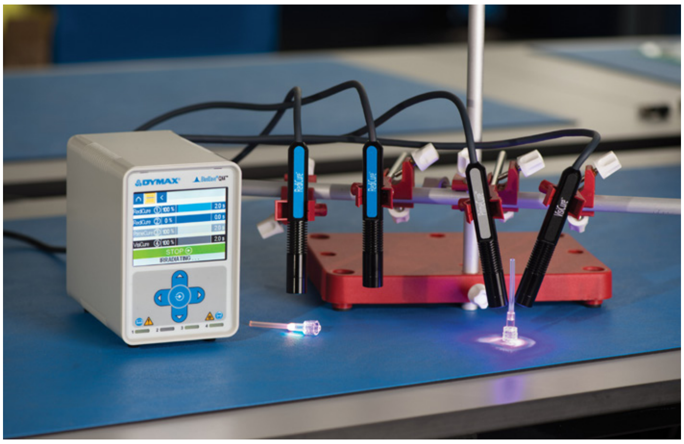


BLUEWAVE® 200 VERSION 3.0 LIGHT-CURING SPOT LAMP

- **Ideal for fast processing of small curing areas**
- **Suited for manual or automated processes**

BLUEWAVE MX-150® LED LIGHT-CURING SYSTEM

- **Emitter design for set up flexibility and consistent intensity**
- **Ideal for cool spot curing coatings**
- **PLC interface that can be easily incorporated into automated systems**



BLUEWAVE® QX4® LED LIGHT-CURING SYSTEM

- **One controller controls up to four LED heads**
- **LED heads are available in 365, 385, and 405 nm wavelengths**
- **PLC interface that can be easily incorporated into automated systems**

CONVEYOR SYSTEMS

Conveyor systems consist of a moving belt that passes through a curing tunnel with multi-spectrum lamps mounted above or on each side for rapid curing of parts. These conveyor systems are designed to offer consistent, fast, and safe curing. They can be outfitted with standard metal halide (longwave UV), mercury (shortwave UV), visible bulbs, or LED flood arrays. Consistent line speed, lamp height, and intensity provide a consistent light-curing process for high throughput.

UVC-8 LIGHT-CURING CONVEYOR SYSTEMS

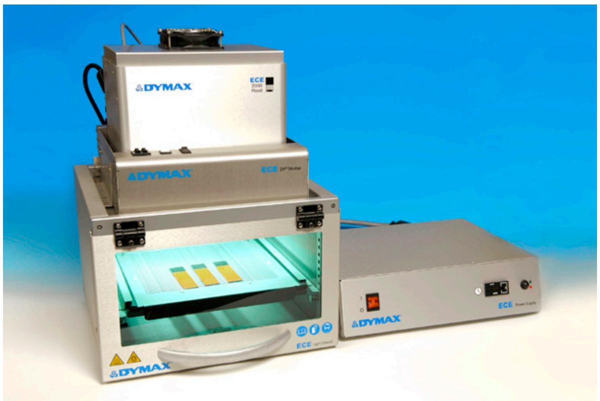
- **Ideal for production and lab environments**
- **High intensity**

UVC-5 LIGHT-CURING CONVEYOR SYSTEMS

- **Ideal for curing smaller parts**
- **Medium intensity**

FLOOD LAMPS

Static flood-lamp systems are suited for area curing or for curing multiple assemblies. Dymax offers UV models which use moderate- to high-intensity, multi-spectrum UV/Visible light and LED models that use light-emitting diodes for fast curing. Dymax flood lamps can be easily integrated into existing manufacturing processes by mounting the lamps above high-speed assembly lines to achieve rapid cures. Shutter assemblies, mounting stands, and shields are available to create a custom curing system.



ECE 5000 FLOOD LAMP SYSTEMS

- **Most popular and versatile**
- **Ideal for potting, sealing, and encapsulating applications**

ECE 2000 FLOOD LAMP SYSTEMS

- **Flood lamp with the largest cure area**
- **Ideal for LED and masking applications**

RADIOMETERS

Measurement of the lamp intensity and dosage is critical to the successful implementation of light-curing technology. Dymax radiometers allow operators to monitor and document a light-curing process.

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