Light Curable Materials for Satellites and Spacecrafts

- One-part, halogen-free materials with no added solvents
- RoHS compliant and REACH registered materials
- Materials cure in seconds with light for faster processing and increased productivity
- Products available that meet ASTM E595 Low Outgassing NASA specification
- UL94-V0 flammability rated and fluorescing products available
- Dual-cure secondary moisture cure materials available for shadow areas

The aerospace industry is evolving, and design requirements push the limits for avionic systems controlling and supporting satellites and spacecraft - manned and unmanned. Systems such as navigation, communication, weather, system controls, and terrestrial must be engineered using materials that can withstand the harsh environments these systems are exposed to. Dymax meets these rigorous aerospace industry demands with brilliant and green material solutions.

Low Outgassing, Low Ionic Content, & Mil Std 883 Compliant Materials

Under conditions of heat, vacuum, or both, plastic material can exhibit a loss in weight due to gaseous emission. Severe outgassing could be a concern for any or all the following reasons:

- Outgassing could indicate decomposition or a change in the structure of a substrate, coating, or adhesive.
- Vapor deposition on a surface must remain clean or retain its electrical properties.
- Vapor depositions could conceivably indicate potential corrosion, plastics crazing, or other surface weakening mechanisms.
- Contamination of the environment the part is used in.

Low ionic content is crucial for satellite and spacecraft avionics, ensuring reliability, longevity, and preventing electrical failures in harsh space environments. Materials with low ionic content assist with:

- Minimizing corrosion
- Preventing electrochemical migration
- Maintaining high insulation resistance
- Avoiding outgassing and contamination
- Ensuring mission reliability

Due to this, materials used in these systems must be NASA low outgassing approved to ASTM E595 and Mil Std 883 Method 5011. This is a requirement before considering the evaluation of a new adhesive or coating.

NASA low outgassing testing is run at 125°C (257°F) under a 5 x 10-5 Torr vacuum for 24 hours. The total weight loss (TML) and condensable volatile material (CVCM) are measured. CVCM is of particular interest to avionics or optoelectronic applications. It might indicate that optical parts could become fogged, electrical continuity lost, or some other effect caused by material being deposited where it is not intended.

Additionally, Mil-Std 883 Method 5011 is the requirement for military and aerospace micro-electronic systems, including environmental tests to evaluate resistance to deleterious effects of natural elements and conditions surrounding military and space operations; mechanical and electrical tests to ensure a consistent level of quality and reliability for these critical components.

Available Light-Curable Materials for Satellite and Spacecraft Applications

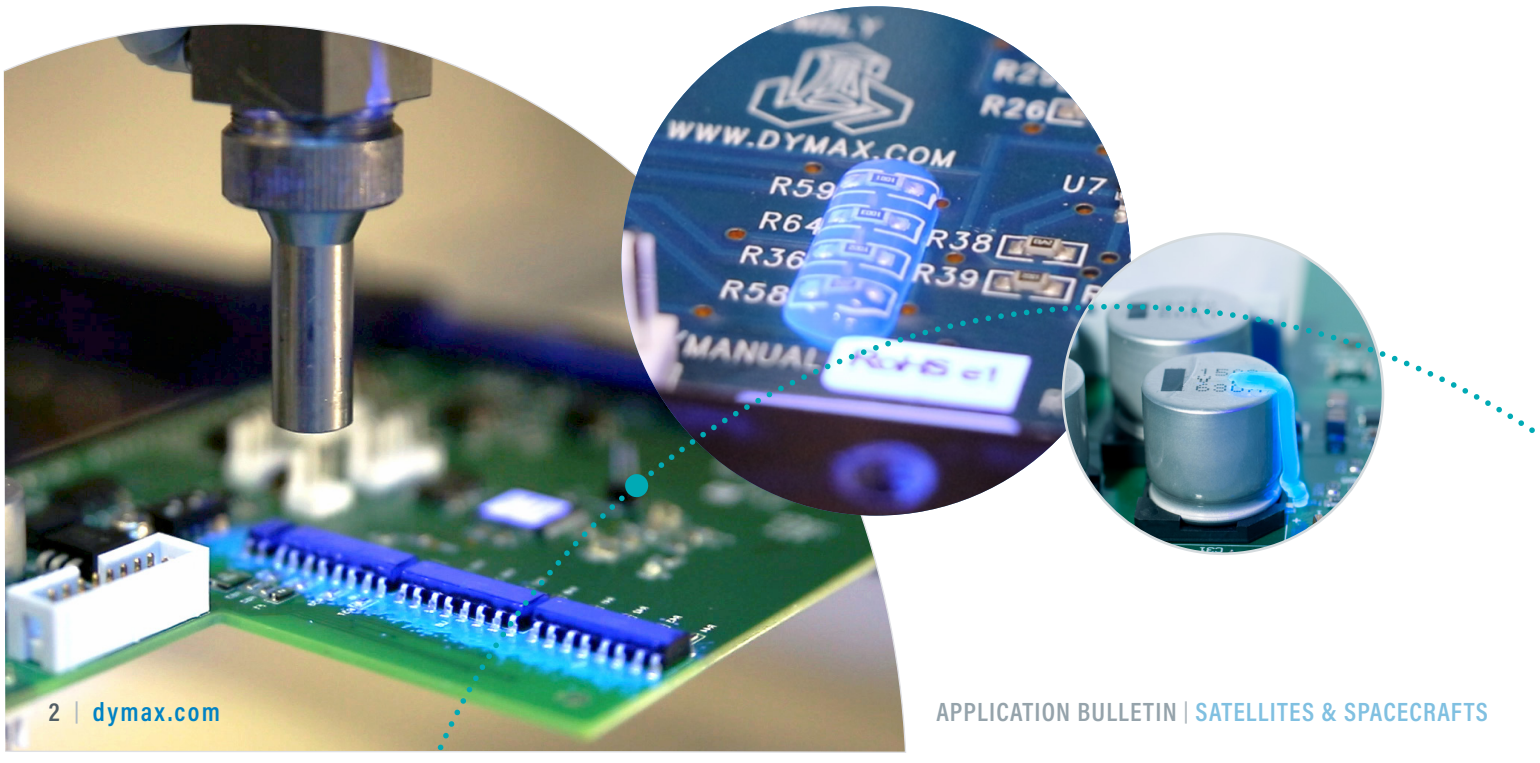
Conformal Coatings: Our conformal coatings have no added solvents and protect printed circuit boards from environmental hazards with innovation that meets both ASTM E595 and Mil-Std 883 Method 5011.

Encapsulants: Dymax encapsulants protect critical electronic components protect sensitive components against moisture, chemicals, and contaminants.

Maskants: Maskants provide selective surface protection during conformal coating.

Positioning Adhesives: With very low volumetric shrinkage and low CTE, our positioning adhesives ensure precise placement of critical components during active alignment.

Staking & Ruggedizing Adhesives: Our staking and ruggedizing adhesives fortify components and reduce stress due to shock and vibration.



Product	Cure			Features	Applications					Viscosity, cP	Durometer Hardness	Elongation at Break, %	Modulus of Elasticity, MPa [psi]	Tensile at Break, MPa [psi]
	UV/Visible Light	Heat	Moisture		Conformal Coating	Encapsulation	Masking	Positioning	Staking & Ruggedizing					
9771	•		•	Meets ASTM E595 low outgassing; low ionic content (MIL-STD 883 Method 5011 compliant); corrosion and temperature/ humidity resistance; blue fluorescing; NASA MAPTIS material number 09841, UL 94V-0, UL 746-E, MIL-I-46058C, IPC-CC-830-B	•					780	A62	13	910.3 [132,026]	20.4 [2,952]
9773	•			Meets ASTM E595 low outgassing; low ionic content (MIL-STD 883 Method 5011 compliant); halogen and silicone free; jetting compatible; slump resistance at 90° up to 72 hours; NASA MAPTIS material number 09907					•	54,000	D47	85	103 [150,000]	12 [1,700]
9801	•	•		Low shrinkage and outgassing; one-part epoxy; low temperature heat cure (80-85°C); good moisture and thermal resistance; cold storage/ship; flexible		•		•	•	60,000	D90	2	1,600 [230,600]	45 [6,600]
9803	•	•		Very low volumetric shrinkage and water absorption; low outgassing; one-part epoxy; low temperature heat cure (80-85°C); moisture and thermal cycle resistant; cold storage/ship		•		•	•	86,000	D94	1.2	3,983 [578,000]	36.7 [5,328]
9-20479-B-REV-A	•			Blue, peelable mask; compatible with gold and copper connector pins; silicone and halogen free			•			115,000	A75	140	4.13 [600]	3.37 [490]

The below products have been tested to the ASTM E595 standard and meet the TML and CVCM thresholds historically used as screening for spacecraft materials:

Adhesive Tested	Product Type	Total Weight Loss* (TML), %	Volatile Condensable Material (CVCM), %
9771	Light + Moisture Conformal Coating	0.09	0.02
9773	Staking & Ruggedizing Adhesive	0.86	0.04
9801	Low Shrinkage Active Alignment Epoxy	0.57	< 0.01
9803	Low Shrinkage Active Alignment Epoxy	0.48	< 0.01
Screening Level		1.00 maximum	0.10 maximum

* Estimated to be primarily entrapped air or moisture.

Our Commitment to Safer, Sustainable Manufacturing

Dymax is committed to sustainable manufacturing that reduces environmental impact, conserves energy, and provides greater worker safety. Over the last 40 years, our light-curable materials and curing equipment have become the industry standard for fast, environmentally conscious assembly. Dymax products are readily replacing technologies that contain hazardous ingredients, produce waste, or require higher amounts of energy to process.

Eco-friendly, one-component materials

Materials with no added solvents for improved worker and user safety

Fast curing products and equipment designed for less energy consumption

Dymax meets global statutory and regulatory requirements

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