LS2-6140

Optically clear primerless silicone encapsulant

DESCRIPTION

- Two Part, Transparent, 1:1 Mix ratio (A:B)
- Low volatility and high purity
- High tensile strength, low viscosity
- REACH and RoHS compliant
- Tested per UL-94 and passed V-0
- Requires heat to cure

APPLICATION

- Designed for optically harsh environments such as High Power LED and UV LED packages
- Generates zero defect devices (See Appendix 1)
- Adheres to ceramic, PPA and aluminum without a primer (See Appendix 1)
- Has excellent thermal stability (See Appendix 1)
- Protects electrical components and assemblies against shock, vibration, moisture, dust, chemicals, and other environmental hazards

PROPERTIES

Typical Properties	Average Result	Standard	NT-TM
Uncured:			
Appearance	Colorless and Transparent	ASTM D2090	002
Viscosity, Part A	3,300cP	ASTM D1084, D2196	001
Viscosity, Part B	2,500 cP	ASTM D1084, D2196	001
Viscosity, Mixed within 30 minutes (V1)	3,000 cP	ASTM D1084, D2196	001
Viscosity, Mixed after 24 hrs (V2) versus V1	40% Max increase from V1	ASTM D1084, D2196	001
Cured: 60 minutes at 150°C (302°F)			
Durometer, Type A	49	ASTM D2240	006
Tensile Strength	1106 psi (7.6 MPa)	ASTM D412	007
Elongation	125 %	ASTM D412	007
Refractive Index at 589 nm	1.41	ASTM D1218, D1747	018
Volatile Content (1 hour at 275°C)	0.6%	ASTM D2288	004

Typical Properties	Average Result	Standard	NT-TM
Glass Transition Temperature (Tg)	-115 °C	ASTM D3418	-
Coefficient of Linear Expansion (-100°C to 100°C)	330 ppm/°C (330µm/m°C)	ASTM E831	-
Lap Shear to Aluminum (unprimed)	350 psi (2.4 MPa)	ASTM D1002	010
Die Shear	1.1 N/mm^2	MIL-STD-883G	317
Dielectric Constant, 100 Hz	2.80	ASTM D150	906
Dielectric Constant, 1 kHz	2.80	ASTM D150	906
Dissipation Factor, 100 Hz	0.0004	ASTM D150	906
Dissipation Factor, 100 kHz	0.0006	ASTM D150	906
Dielectric Strength	660 V/ml (25.7 kV/mm)	ASTM D149	243
Volume Resistivity	1.1 X 10^{15} ohm•cm	ASTM D257	153
Ionic Content, Na	<2.5 ppm	MIL-STD-883E	-
Ionic Content, K	<2.5 ppm	MIL-STD-883E	-
Ionic Content, Cl	<5 ppm	MIL-STD-883E	-
Tested per UL-94 (3.7 mm average thickness)	V-0		
Recommended cure time guidelines at various temperatures*		ASTM D2084	069
T90 at 80°C	85 minutes	-	-
T90 at 100°C	25 minutes	-	-
T90 at 120°C	18 minutes		
Transmittance vs. Wavelength (25°C)	See Appendix 2	-	-
Refractive Index vs. Wavelength (25°C)	See Appendix 2	-	-
Refractive Index vs. Temperature by Wavelength	See Appendix 2	-	-

The test data shown for this material is the average value for typical properties. All of these properties may not be tested on a lot to lot basis and cannot be used to draft specifications. Please contact NuSil® for assistance and recommendations in establishing limits for product specifications.

*Recommended cure time are based on the testing performed via ODR (Oscillating Disk Rheometer) where T90 is considered 90% full cure. However the cure times can be affected by multiple factors, including but not limited to, quantity of silicone used, time to heat the entire device or mold, and whether the material is cured in pre-heated oven or not. The cure times listed are not tested on a lot-to-lot basis.

INSTRUCTIONS FOR USE

Mixing and Vacuum Deaeration

Combine Part A and Part B in a 1:1 mix ratio prior to use. Airless mixing, metering or dispensing equipment is recommended for production operations. If mixing by hand, take care to minimize air entrapment.

Remove air entrapped during mixing by common vacuum deaeration procedure, observing all applicable safety precautions. Slowly apply full vacuum to a suitable container of at least four times the volume of material being de-aired. Hold vacuum until bulk deaeration is complete. For further information please see Mixing and De airing Addition Cure Silicones

Substrate Considerations

LS2-6140 cures in contact with most materials common to electronic assembles. Exceptions include butyl and chlorinated rubbers, some Tin condensation cure silicones and unreacted residues of some curing agents. Units being encapsulated or potted should be clean and free of surface contaminates. Containers and dispensers being used should also be clean and dry. Cure inhibition can usually be prevented by washing all containers with solvent or volatizing the contaminant by heating. For further information please see Avoiding Cure Inhibition.

USE BY DATE

LS2-6140 has a use by date of 6 months from the date of manufacture when stored below 40°C in original, unopened containers.

OPERATING TEMPERATURE

The operating temperature range of a silicone in any application is dependent on many variables, including but not limited to: temperature, time of exposure, type of atmosphere, exposure of the material's surface to the atmosphere, and mechanical stress. In addition, a material's physical properties will vary at both the high and low end of the operating temperature range. This type of silicone typically remains flexible at extremely low temperatures and has been known to perform at -50°C (-58°F) as well as resist breakdown at elevated temperatures up to 200°C (392°F). The user is responsible to verify optical and mechanical performance of a material in a specific application.

ROHS AND REACH COMPLIANCE

Packaging	Use By Date
50 Gram Kit (0.5 kg) 50 mL SxS Kit (0.054 kg) 2 Pint Kit (0.91 kg) 2 Gallon Kit (7.28 kg) 10 Gallon Kit (36.4 kg)	6 Months

Please contact NuSil Regulatory Compliance department with any questions or for further assistance

SPECIFICATIONS

Do not use the typical properties shown in this technical profile as a basis for preparing specifications. Please contact NuSil for assistance and recommendations in establishing limits for product specifications.

WARRANTY INFORMATION

Unless NuSil Technology LLC provides a specific written warranty of fitness for a particular use, NuSil's sole warranty is that the product will meet NuSil's then current specification. NuSil specifically disclaims all other expressed or implied warranties, including, but not limited to, warranties of merchantability and fitness for use. The exclusive remedy and NuSil's sole liability for breach of warranty is limited to refund of purchase price or replacement of any product shown to be other than as warranted. NuSil expressly disclaims any liability for incidental or consequential damages.

WARNINGS ABOUT PRODUCT SAFETY

NuSil believes, to the best of its knowledge, that the information and data contained herein are accurate and reliable. The user is responsible to determine the material's suitability and safety of use. NuSil cannot know each application's specific requirements and hereby notifies the user that it has not tested or determined this material's suitability or safety for use in any application. The user is responsible to adequately test and determine the safety and suitability for their application and NuSil makes no warranty concerning fitness for any use or purpose. NuSil has completed no testing to establish safety of use in any medical application.

NuSil has tested this material only to determine if the product meets the applicable specifications. (Please contact NuSil for assistance and recommendations when establishing specifications.) When considering the use of NuSil products in a particular application, review the latest Material Safety Data Sheet and contact NuSil with any questions about product safety information.

Do not use any chemical in a food, drug, cosmetic, or medical application or process until having determined the safety and legality of the use. The user is responsible to meet the requirements of the U.S. Food and Drug Administration (FDA) and any other regulatory agencies. Before handling any other materials mentioned in the text, the user is advised to obtain available product safety information and take the necessary steps to ensure safety of use.

PATENT / INTELLECTUAL PROPERTY WARNING

NuSil disclaims any expressed or implied warranty against the infringement of any domestic or international patent/intellectual property right. NuSil does not warrant the use or sale of the products described herein will not infringe the claims of any domestic or international patent/intellectual property right covering the product itself, its use in combination with other products, or its use in the operation of any process.

APPENDIX 1 – DEVICE RELIABILITY DATA

Figure 1. SMD Package After Solder Reflow Testing (aspect ratio 1:4)

Thermal Cycling

- 3528 PPA Sideview packages for mobile phone
- Solder Reflow Conditions: 280˚C to -40˚C for 10 cycles
- Standard Thermal Cycling: 105˚C to -40˚C 1000 cycles
- Identify cracks and delamination 0 defects in 3,000 packages

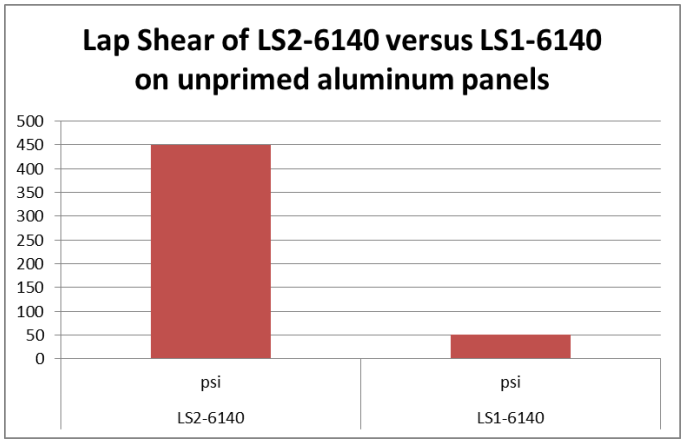
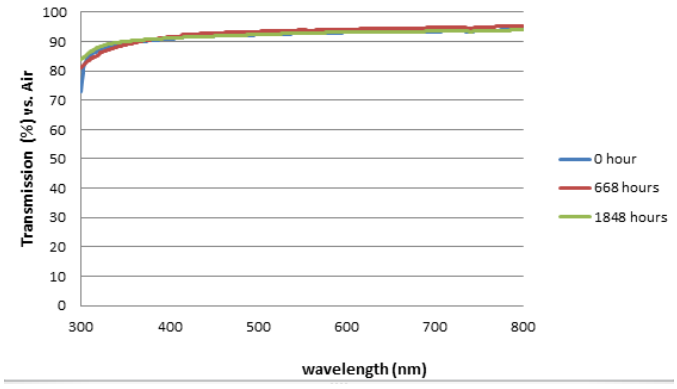


Figure 2. Lap Shear of LS2-6140 versus LS1-6140 on aluminum

Improved Adhesion

- A significant increase in adhesion onto aluminum



Optically Robust

- No change in optical transparency
- Aged at 150°C in air

Figure 3. Transmittance curves (300-800 nm) before and after thermal aging (2 mm thickness) at 150 °C

APPENDIX 2 - OPTICAL PROPERTIES

The data represented below is from a limited sample population and is qualitative only. The batch tested was determined to represent the typical procedures and properties of this product. These tests are not performed on a lot to lot basis and are not intended to be used as specifications.

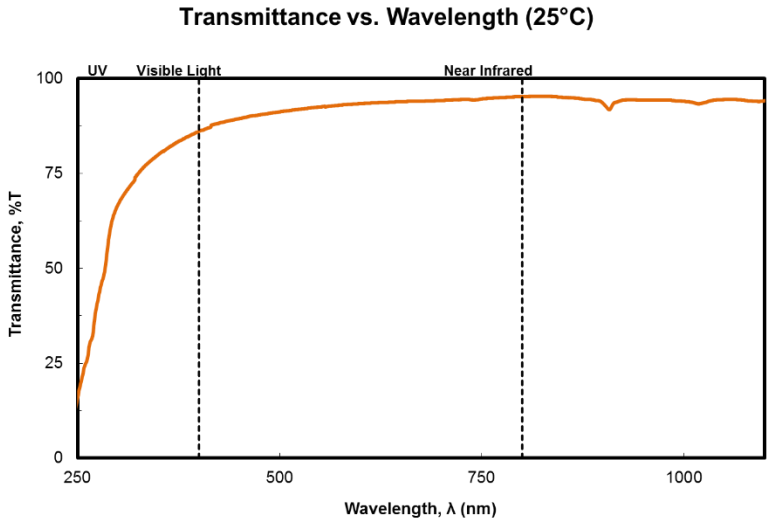


Figure 1. % Transmittance versus air, 2mm thickness

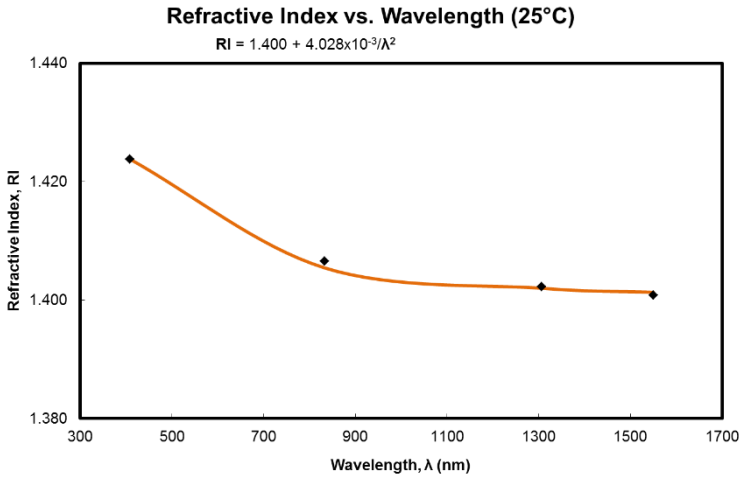


Figure 2. Refractive Index vs. Wavelength, at 25°C

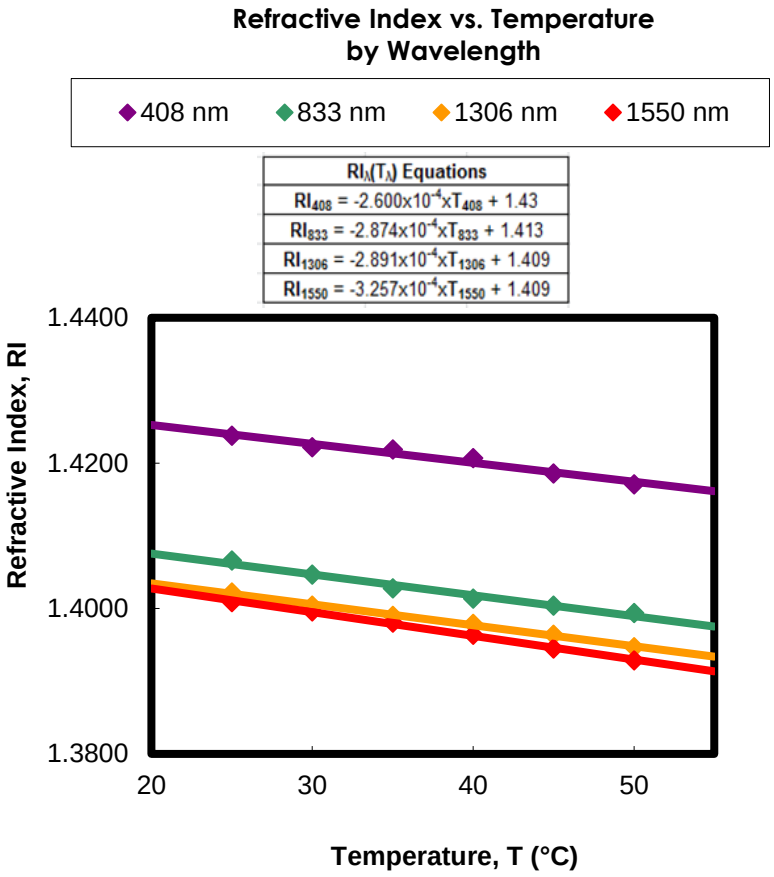


Figure 3. Refractive Index vs. Temperature, at various wavelengths.