ADVANCED ENGINEERING

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	3,100 cP	ASTM D1084, D2196	001
Viscosity, Part B	2,300 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	47	ASTM D2240	006
Tensile Strength	940 psi (6.5 MPa)	ASTM D412	007
Elongation	125 %	ASTM D412	007
Refractive Index at 589 nm	1.41	ASTM D1218, D1747	018

TYPICAL PROPERTIES	AVERAGE RESULT	STANDARD	NT-TM
Volatile Content (1 hour at 275°C)	0.7%	ASTM D2288	004
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)	390 psi (2.7 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	-	-

*These properties are NOT tested on a lot-to-lot basis. Please contact NuSil Technology for assistance and recommendations in establishing particular specifications.

**Recommended cure times are based on the testing performed via ODR (Oscillating Disk Rheometer) where T90 is considered 90% of 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.

Packaging

50 Gram Kit
50 mL Side-by-Side Kit
2 Pint Kit (910 g)
2 Gallon Kit (7.25 kg)
10 Gallon Kit (36.4 kg)

Use By Date

6 Months

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.

RoHS AND REACh COMPLIANCE

LS2-6140 is compliant with the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) regulation contained in Article 4(1) of the European Parliament and Council's Directive 2002/95/EC. RoHS mandates that manufacturers restrict the use of lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, polychlorinated biphenyls, and polybrominated diphenyl ethers in electrical and electronic equipment.

LS2-6140 is compliant with the Registration, Evaluation, and Authorization of Chemicals (REACh) regulation (European Union 1907/2006). LS2-6140 does not contain any of the chemicals identified as Substances of Very High Concern (SVHC) by the European Chemicals Agency (ECHA), which oversees REACh compliance.

Please contact NuSil Technology's Regulatory Compliance department with any questions or for further assistance.

SPECIFICATIONS

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

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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

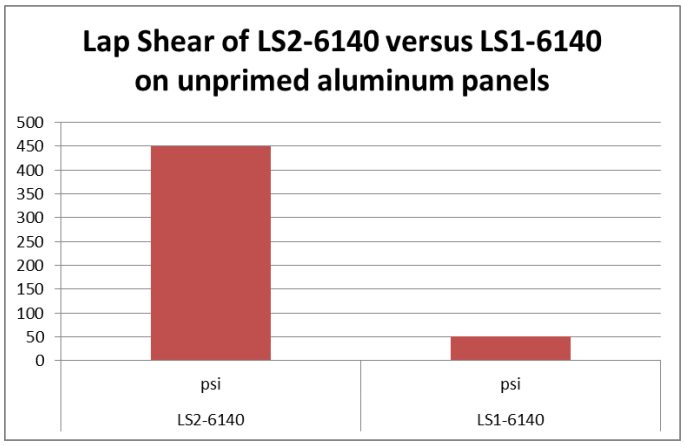

Figure 2. Lap Shear of LS2-6140 versus LS1-6140 on aluminum

Improved Adhesion

- A significant increase in adhesion onto aluminum

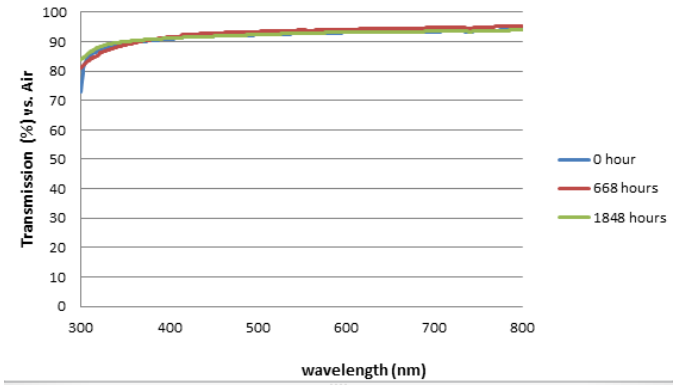

Figure 3. Transmittance curves (300-800 nm) before and after thermal aging (2 mm thickness) at 150◦C

Optically Robust

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

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.

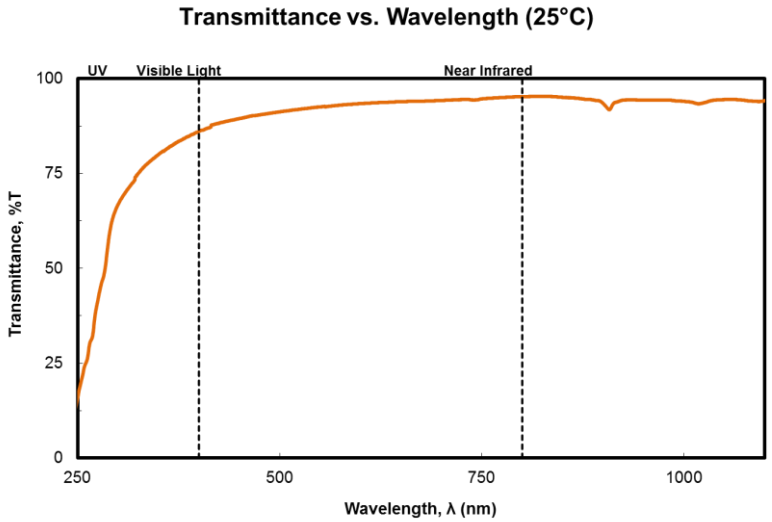

Figure 1. % Transmittance versus air, 2mm thickness

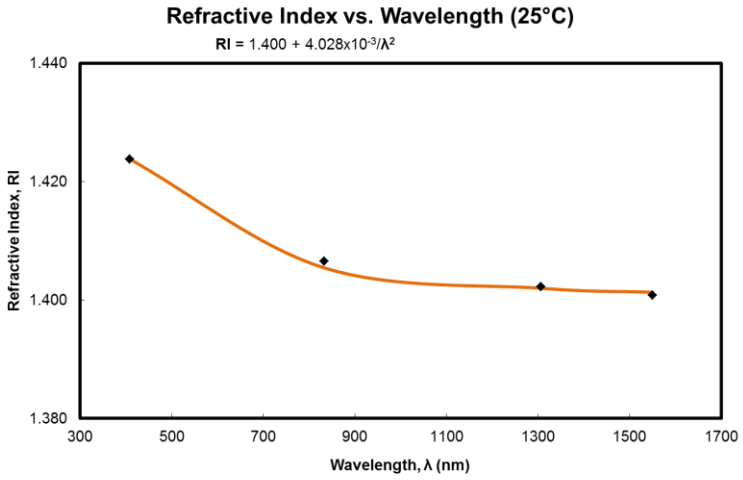

Figure 2. Refractive Index vs. Wavelength, at 25°C

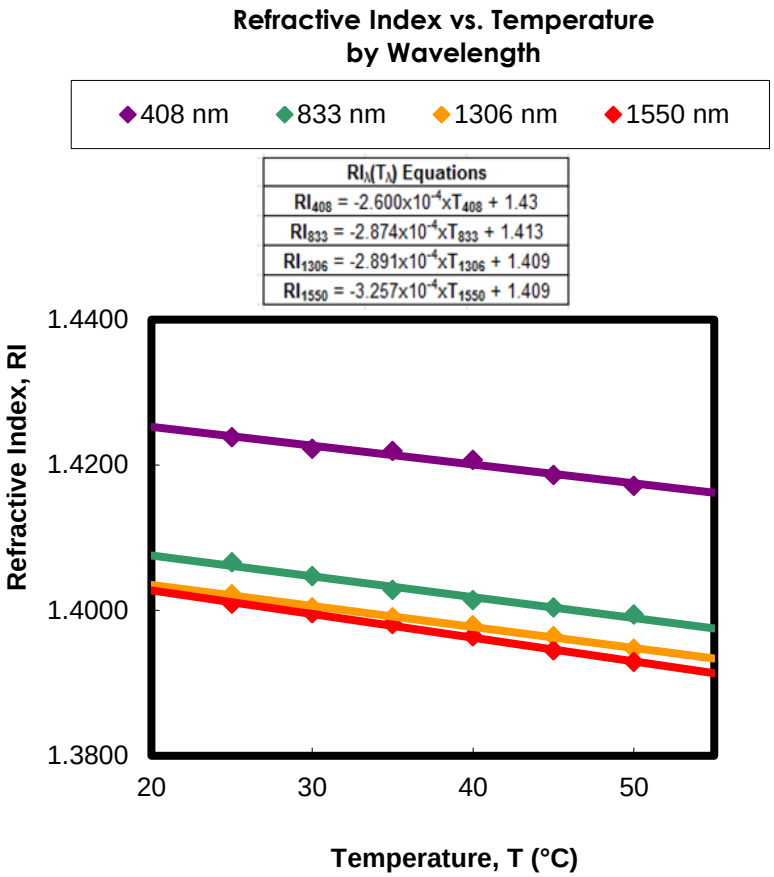

Figure 3. Refractive Index vs. Temperature, at various wavelengths.