



TCL-203

Thermal Conductive Dual-Curable Epoxy Adhesive

PRODUCT DESCRIPTION:

- Base chemistry: epoxy only, cationic polymerization
- One component Boron Nitride filled non-electrically conductive adhesive ready for use, UV + heat curing
- Average particle size 7 μm and max size 30 μm

PRODUCT USE:

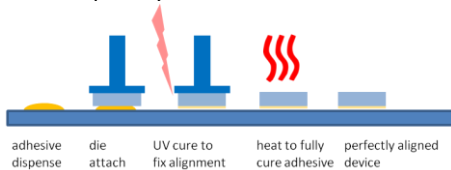
- Bonding integrated circuits and components in semiconductor packaging.
- Heat transfer and dissipation
- Bonding of opaque substrates

FEATURES:

- Thermal conductive and electrical insulating, high adhesion, high Tg, long shelf and working life, low outgas, excellent reliability performances, robust for solder reflow process

INSTRUCTIONS FOR USE:

- 1) Clean the substrates to remove contamination.
- 2) Dispense adhesive on substrates
- 3) Bond substrates (with active alignment – optional)
- 4) UV cure to fix alignment
- 5) Thermal cure: heat is mandatory for completely cured adhesive



GENERAL USAGE INFORMATION:

Shipment: adhesive is shipped in “cold pack with ice bricks”, no Dri ice

Storage: After receipt, cold storage at -20 °C or -40 °C in the original container is required

Before use: The cold adhesive needs to reach RT (23-25°C) before use. The container needs to sit at RT, adding heat is not allowed. Room temperature equilibration time is dependent on container size, but a 10-30 gram syringe equilibration time is approximately 30-60 minutes. Condensed water on the container must be removed prior to use

SAFETY AND HANDLING

The uncured adhesive can be cleaned from apparatus with isopropyl alcohol (IPA), methyl ethyl ketone (MEK), or commercial alcohol based cleaning solution. Avoid direct skin and eye contact. Use only in well ventilated areas. Use protective clothing, gloves and safety goggles. Read [Material Safety Data Sheet](#) before handling.

CURING CONDITIONS: 2 curing ways: UV + heat or heat

- 1) **UV + Heat curing:** fix aligned parts with UV, then use heat to completely cure adhesive including adhesive in shaded areas.

First step: UV cure

*Metal halide/Mercury UV: UV-A (320-400 nm), intensity: 100-1,000 mW/cm²

*LED-365 nm, UV light intensity: 100 to 1,000 mW/cm²

LED-365 nm		Metal Halide/Mercury(UV-A: 320-400 nm)	
UV intensity(mW/cm ²)	x time (sec)	UV intensity(mW/cm ²)	x time (sec)
100	100 sec or more	100	50 sec or more
or 200	50 sec or more	or 200	25 sec or more
or 300	35 sec or more	or 300	17 sec or more
or 400	25 sec or more	or 400	13 sec or more
or 500	10 sec or more	or 500	10 sec or more
or 1,000	5 sec or more	or 1,000	5 sec or more

Second step: heat cure: the adhesive is exposed to UV light first, then heat cure

* 90 °C for 60 to 90 minutes

- 2) **Heat curing:** the adhesive will cure by only heat 90°C for 60 to 90 minutes or 100°C for 60 minutes or 110°C for 45 to 60 minutes
 - The actual heat cure time is dependent on the heating time of the bonded components. The heat time of the components must be added to the total cure time of the adhesive for the process
 - The effect of humidity is greater for very thin film, if the adhesive layer is <25 μm, then longer cure time might be needed
 - To ensure good curing speed, the humidity should be <60% RH
 - Epoxy adhesives have post cure properties. Adhesion strength testing should be conducted at least 24 hrs after part assembly.

TYPICAL PROPERTIES

Uncured resin

Viscosity at 25 °C, mPa.s or cps (shear rate: 10/s)	52,000 to 57,000
Thixotropic index (shear rate: 1/s over 10/s)	3
Shelf life (-40 to -20°C):	6 months
Pot life or working life (20 - 25°C):	48 hours
Appearance of uncured adhesive	white paste
Density (g/mL)	1.3

Cured film

Shrinkage (linear, %)	< 0.3
Hardness – Shore D	85-90
Outgas, weight % (per MIL-STD 883/5011)	0.11
Outgas, weight % (per Telcordia GR-1221)	0.06
Glass transition temperature (DMA, °C)	181
Volume Resistivity, ohm-cm	>10 ¹³
<u>Thermal Properties</u>	
Thermal Conductivity:	
	3.3 W/m °K (75 μm film)
	1.5 W/m °K (500 μm film)
Coefficient of thermal expansion (DMA)	
below Tg (x10 ⁻⁶), °C ⁻¹	21
above Tg (x10 ⁻⁶), °C ⁻¹	60
Physical properties tested at 25°C, 50% RH (ASTM D638)	
Tensile strength, MPa	151
Elongation (%)	3
Young’s Modulus, MPa	15,700
Operating temperature, °C	-60 to 200

The information presented here represents our best available information and is believed to be reliable, but it should not be considered specifications and does not constitute any guarantee or warranty. Inasmuch as Addison Clear Wave has no control over the exact manner in which others may use this information, it does not guarantee the results to be obtained. Nor does the company make any expressed or implied warranty of merchantability, or fitness for a particular purpose concerning the effects or results of such use. Purchasers are further responsible for determining the suitability of the product for its intended use and the appropriate manner of utilizing the production processes and applications so as to ensure safety, quality and effectiveness. Addison Clear Wave makes no warranties and assumes no liability in connection with the use or inability to use this product. V3112816