



TCR-1003-R1

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, solvent-free, UV and heat curing
- Average particle size 2 µm and max size 10 µm

PRODUCT USE:

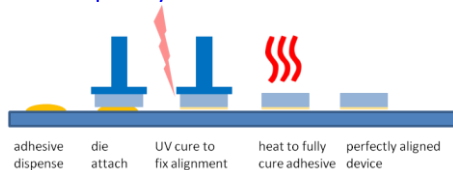
- Bonding integrated circuits and components in semiconductor packaging; underfill
- Heat transfer and heat dissipate
- Bonding of opaque substrates

FEATURES:

- Thermal conductive and electrical insulating, epoxy only, 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, dust, moisture, salt and/or oil
- 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: no restriction on shipment and no cold shipment is needed

Storage: After the adhesive is received in black syringes or amber HDPE bottles, room temperature storage (15-30°C) in the original container is required.

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	20 sec or more	or 500	10 sec or more
or 1,000	10 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

* 140 to 150 °C for 120 to 180 minutes

- 2) **Heat curing:** the adhesive will cure by only heat 140°C for 4-5 hrs or 150°C for 1 to 2 hrs or 180°C for 30 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)	9,000 to 11,000
Thixotropic index (shear rate: 1/s over 10/s)	2
TCR-1003-R1 is designed for flowability	
Appearance of uncured adhesive	white paste
Shelf life (20 – 25 °C)	3 months
Work life (Pot life) (20 – 25 °C)	2 months
Density (g/mL)	1.3

Cured film

Shrinkage (linear, %)	< 0.3
Hardness – Shore D	85
Outgas, weight % (per MIL-STD 883/5011)	0.08
Outgas, weight % (per Telcordia GR-1221)	0.06
Glass transition temperature (DMA, °C)	166
Volume Resistivity, ohm-cm	>10 ¹³

Thermal Properties

Thermal Conductivity: 2.6 W/m °K (75 µm film)
1.25 W/m °K (500 µm film)

Physical properties tested at 25°C, 50% RH (ASTM D638)

Tensile strength, MPa	150
Elongation (%)	3
Young's Modulus, MPa	15,900
Operating temperature, °C	-60 to 200

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