

THERMO

COOL

**YOUR THERMAL
MANAGEMENT SOLUTION**

THERMOCOOL 4W

- Single-Component
- Screen Print or Via Fill Application
- Thermally Cured
- Thermal Conductivity > 4W/mK
- Low outgassing
- Halogen free
- Silicone free
- Epoxy based
- High Tg (169°C)
- Very low CTE
 - α_1 – 14 ppm
 - α_2 – 45 ppm

PROCESSING PARAMETERS FOR THERMOCOOL 4W

ThermoCool 10.2W has a gray matte finish. It is a single-component, thermally cured product. It has been designed as a thermal conductive / heat dissipating product. **ThermoCool 4W** has multiple applications for the PCB manufacturing process. It can be applied via screen printing as a thermal conductive adhesive/underfill for packaging. It can also be screen printed as a Thermal Interface Material (TIM) for LED applications and lastly it can be used for via fill applications to improve thermal management. All Taiyo America products comply with the Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the Restriction of the use of certain Hazardous Substances (RoHS) in electrical and electronic equipment.

PRODUCT STORAGE

ThermoCool 4W is supplied in cartridges or larger 1 kg containers.

ThermoCool 4W needs to be stored frozen at or below 14°F (-10°C) to maintain a 1-year shelf life.

Other storage guidelines are listed below:

Storage Temperature	Maximum Storage ThermoCool 4W
Freezer: 14°F (-10°C)	365 days
Refrigerated: 41°F (5°C)	180 days
Room Temperature: 68°F (20°C)	30 days

PRE-CLEANING

Prior to via filling, ensure that the vias are free of contaminants and oxidation and is dry to increase adhesion. A 5-7% sulfuric or hydrochloric acid wash can be used to prepare the surface prior to application. Hold time after cleaning the vias should be held to a minimum to reduce the oxidation of the copper surfaces. For screen printing as an adhesive/underfill be sure that the coating surface is free of oils and contaminants prior to application.

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SCREEN PRINTING

For adhesive/underfill or Thermal Interface Material application.

- Screen Mesh: 74 – 110
 - Screen Mesh Angle: 22.5° Bias
 - Screen Tension: 20 - 28 Newtons
 - Squeegee: 60 – 80 durometer
 - Squeegee Angle: 27 – 35°
 - Printing Mode: Flood / Print / Print
 - Flood Pressure: 20 – 30 psi
 - Printing Speed: 2.0 – 9.9 inches/sec
 - Printing Pressure: 60 – 100 psi
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OPTION 1

PRELIMINARY CURE

The preliminary cure is used to “set up” the **ThermoCool 4W** for planarization through a scrubber. Recommended conditions for the preliminary cure is:

- Oven Temperature: 125 – 130°C (257 -265°F)
 - Dwell Time: 40 – 70 minutes
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PLANARIZATION

To remove the excess **ThermoCool 4W** that is present on the panel a sanding process needs to be performed. The sanding will provide a planar surface for the subsequent plating process. The recommended grit for the planarization process is 320.

Note: For customers with automated planarization equipment it may be possible to eliminate the ‘Preliminary Cure’ and to fully cure **ThermoCool 4W** before planarization.

FINAL CURE

Thermo Cool 4W requires a thermal cure to insure optimal final property performance. Thermal curing can be done in a batch oven or conveyORIZED oven.

- Temperature: 150°C (300°F)
 - Time at Temperature: 60 minutes
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PROCESSING PARAMETERS FOR THERMOCOOL 4W

OPTION 2

FINAL CURE

ThermoCool 4W requires a thermal cure to insure optimal final property performance. Thermal curing can be done in a batch oven or conveyORIZED oven.

- Temperature: 150°C (300°F)
- Time at Temperature: 60 minutes

PLANARIZATION

To remove the excess **ThermoCool 4W** that is present on the panel a sanding process needs to be performed. The sanding will provide a planar surface for the subsequent plating process. The recommended grit for the planarization process is 320.

For Process Optimization please contact your local Taiyo America Representative

FINAL PROPERTIES FOR THERMOCOOL 4W

TEST	RESULTS
	ThermoCool 4W
Breakdown Voltage	56.5 kV/mm
CTI	>600 Volts
T(g) – TMA	169°C
CTE – TMA (α_1/α_2)	14/45 ppm
Decomposition Temperature	365°C
Thermal Conductivity	4 W/mK
Halogen Level	194 ppm
Outgassing by ASTM E 595 (TML <1.0% and CVCM <0.1%)	TML = 0.57% Pass CVCM = 0.01% Pass WVR = 0.27% Pass