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Technical Data

August 2014

3M™ Thermally Conductive Epoxy Adhesive TC-2707

Product Description

3M™ Thermally Conductive Epoxy Adhesive TC-2707 is a thermally conductive 2-part epoxy using aluminum metal fillers for good thermal conductivity with high adhesion.

Features and Benefits

- High adhesive strength
- Good surface wet out
- Low viscosity for potting application
- Good gap filling
- Thin bonding line
- Good thermal conductivity (0.72 W/m-K)
- Low Cl ion content and outgassing

Typical Uncured Properties

Note: The following technical information and data should be considered representative or typical only, and should not be used for specification purposes.

Product		3M™ Thermally Conductive Epoxy Adhesive TC-2707
Viscosity	Base Accelerator Mixed	170,000 cps 25,000 cps 100,000 cps
Base Resin	Base Accelerator	Epoxy Amine
Filler	Aluminum	50% by weight
Mix Ratio (B:A)	Volume Weight	2:1 2.00 : 0.96
Worklife		60 minutes at 23°C (72°F)



3M™ Thermally Conductive Epoxy Adhesive TC-2707

Typical Cured Properties

Note: The following technical information and data should be considered representative or typical only, and should not be used for specification purposes.

Product	3M™ Thermally Conductive Epoxy Adhesive TC-2707
Color	Gray
Shore D Hardness	84
Glass Transition Temperature	60°C (tan delta) See Chart on page 3
Thermal Coefficient of Expansion	56 x 10 ⁻⁶ /°C (below T _g) 132 x 10 ⁻⁶ /°C (above T _g)
Thermal Conductivity	0.72 W/m-°K
Thermal Impedance	3.51 x 10 ⁻⁵ m°K/W (1 mil)
Volume Resistivity ¹	1.6 x 10 ¹¹ ohm-cm
Total Outgassing	<25 micro-gm/gm (GC/MS, 85°C/3 hours)
Hydrocarbon Outgassing	<25 micro-gm/gm (GC/MS, 85°C/3 hours)
Siloxane Outgassing	<5 micro-gm/gm (GC/MS, 85°C/3 hours)
Extractable Chloride	<30 micro-gm/gm (hexane extraction)

¹ As the 3M™ Thermally Conductive Epoxy Adhesive TC-2707 uses aluminum metal fillers, under certain end use application conditions the effective resistivity and/or effective dielectric strength could be significantly lower than noted. If the metal fillers are "trapped" or "pinched" between two surfaces, an electrical bridge path via the aluminum fillers could occur between these surfaces. Epoxy Adhesive TC-2707 is not suggested for applications where a powered electrical circuit is used or where a reliable volume resistivity and/or dielectric strength is desired. 3M™ Thermally Conductive Epoxy Adhesive TC-2810 uses a ceramic filler and is a suggested product to test for these type of application performance needs.

3M™ Thermally Conductive Epoxy Adhesive TC-2707

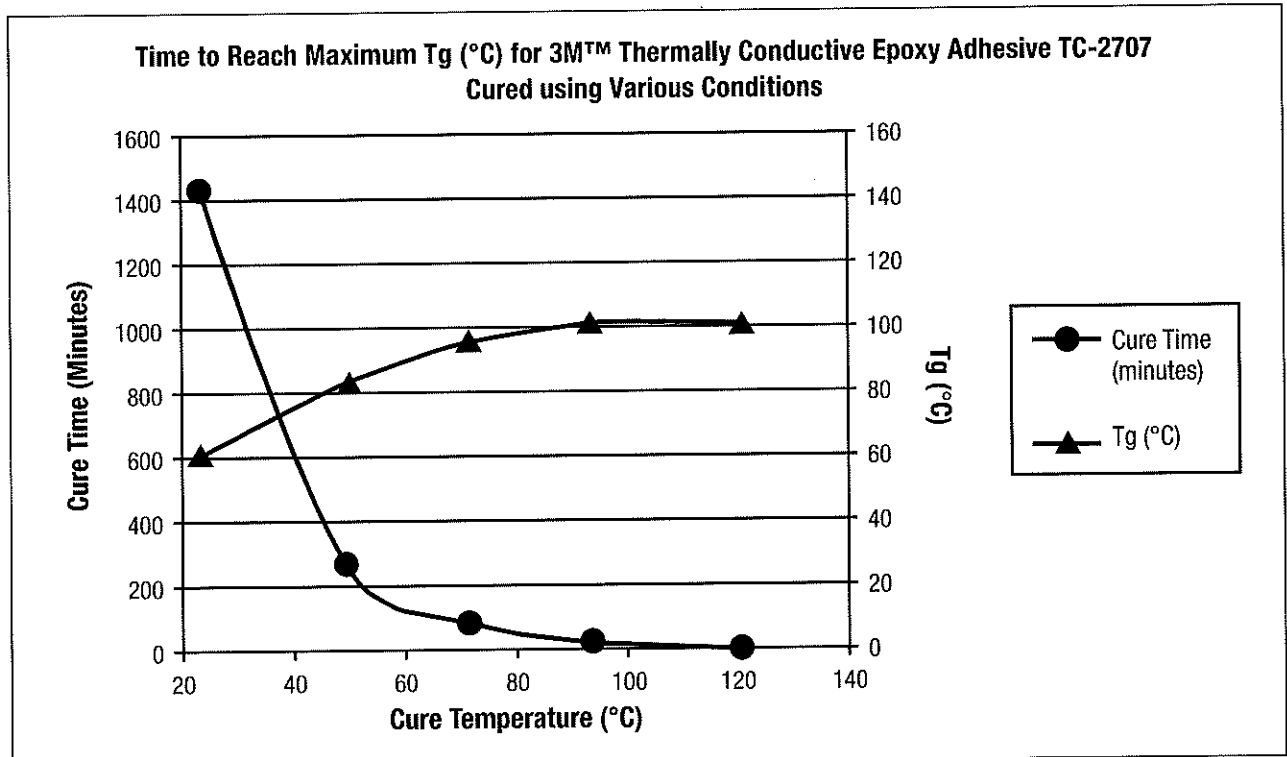
Curing

- Cure Schedule:** 23°C / 24 hours
 50°C / 270 minutes
 70°C / 90 minutes
 90°C / 30 minutes
 120°C / 10 minutes

Note: The following technical information and data should be considered representative or typical only, and should not be used for specification purposes.

Shear Strength, Peel Strength, Tg vs. Cure Temperature/Time

	23°C (72°F) 24 hours	50°C (122°F) 270 minutes	70°C (158°F) 90 minutes	90°C (194°F) 30 minutes	120°C (248°F) 10 minutes
Overlap Shear (psi) (ASTM D-1002)	>2700	>2700	>2700	>2700	>2700
T-Peel (pli) (ASTM D-1876)	>7	>7	>7	>7	>7
Tg (°C) Tan Delta	60	83	95	100	100
Tg (°C) Storage Modulus	48	73	85	86	89



Application and Product Use Notes

For bonding rigid to rigid parts it is suggested that the bond line thickness and edge fillet be designed to optimize:

- i) Bond Strength;
- ii) Thermal Resistance.

A typical suggested bond line is in the 3-7 mil thickness range

For improved thermal performance (lower Thermal Resistance), a thinner bond line is suggested. A thinner bond line can reduce the bond strength so each application needs to be tested to find the correct balance between:

“Bond Line Thickness vs. Thermal Resistance vs. Bond Strength”

A “fillet” at the edges of a bond line is suggested to increase bond strength. The fillets are formed as the epoxy squeezes out past the side edges. Fillets can add strength to the assembly.

3M™ Thermally Conductive Epoxy TC-2707 is supplied in dual syringe plastic duo-pak cartridges as part of the 3M™ EPX™ Applicator System. The duo-pak cartridges are supplied in a 37 ml configuration. To use the 37 ml cartridge simply insert the duo-pak cartridge into the EPX applicator and start the plunger into the cylinders using light pressure on the trigger. Next, remove the duo-pak cartridge cap and expel and discard a small amount of adhesive to be sure both sides of the duo-pak cartridge are flowing evenly and freely (ie: no voids, “plugs of adhesive”, dis-continuity in flow, etc.) Once even side to side and uniform flow from both sides of the duo-pak is confirmed, attach the 3M™ EPX™ Mixing Nozzle to the duo-pak cartridge to ensure proper and uniform mixing of the Part A and Part B and begin dispensing the adhesive.

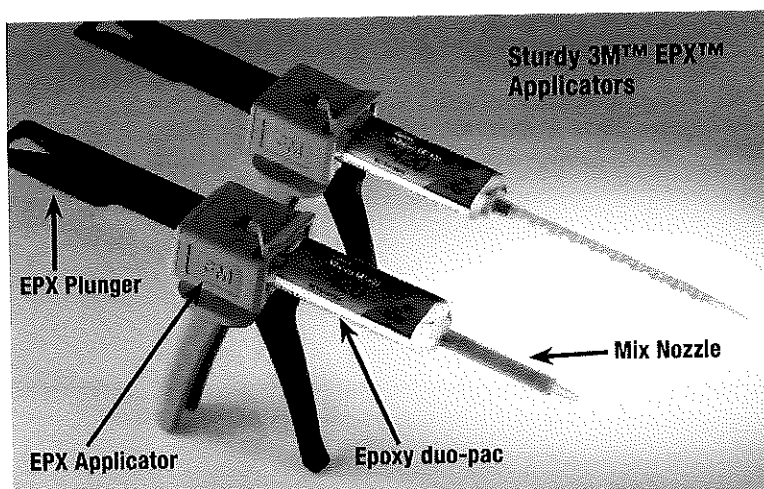
With a 200mil cartridge, the nozzle must be attached before dispensing any material to prevent unmixed adhesive from getting into the applicator cartridge holder. A quantity of material should be dispensed through the mix nozzle and discarded until a uniform color, consistency of product, freely flowing and even side to side flow is evident.

Partially used cartridges must follow the above use instructions to ensure consistent product performance.

Complete and uniform mixing as noted above of the two components is required to obtain consistent product performance.

3M™ EPX™ Applicator and Mix Nozzles

Use only 3M™ EPX™ Applicator and Mix Nozzles to ensure optimum product performance.



Storage and Shelf Life

Storage: Store 3M™ Thermally Conductive Epoxy Adhesive TC-2707 at 15-27°C (60-80°F) or refrigerate for maximum shelf life and to reduce filler settling.

Shelf Life: 3M adhesive TC-2707 has a shelf life of 12 months after date of manufacture when stored in the original packaging and 15-27°C (60-80°F) room temperature storage conditions.

Safety Data Sheet

Consult Safety Data Sheet before use.

Regulatory

For regulatory information about this product, contact your 3M representative.

Technical Information

The technical information, recommendations and other statements contained in this document are based upon tests or experience that 3M believes are reliable, but the accuracy or completeness of such information is not guaranteed.

Product Use

Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. Given the variety of factors that can affect the use and performance of a 3M product, user is solely responsible for evaluating the 3M product and determining whether it is fit for a particular purpose and suitable for user's method of application.

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70-0709-3916-3



3M™ Thermally Conductive Epoxy Adhesive TC-2810

Product Description

3M™ Thermally Conductive Epoxy Adhesive TC-2810 is a thermally conductive 2-part epoxy using boron nitride (BN) filler for good thermal conductivity with high adhesion.

Features and Benefits

- High adhesive strength
- Slight tack allows pre-assembly
- Good surface wet out
- Low viscosity for potting application
- Good gap filling
- Thin bonding line
- Good thermal conductivity (1.0-1.4 W/m-K)
- Low Cl ion content and outgassing

Typical Uncured Properties

Note: The following technical information and data should be considered representative or typical only, and should not be used for specification purposes.

Product		3M™ Thermally Conductive Epoxy Adhesive TC-2810
Viscosity	Base Accelerator Mixed	40,000 - 90,000 cps 11,000 - 21,000 cps 40,000 - 80,000 cps initial
Base Resin	Base Accelerator	Epoxy Amine
Filler	Boron Nitride	24% by weight
Mix Ratio (B:A)	Volume	2:1
Worklife		60 minutes at 23°C (72°F)
Net Weight (lb/gal)	Base Accelerator Mixed	10.84 10.28 10.63



3M™ Thermally Conductive Epoxy Adhesive TC-2810

Typical Cured Properties

Note: The following technical information and data should be considered representative or typical only, and should not be used for specification purposes.

Product	3M™ Thermally Conductive Epoxy Adhesive TC-2810
Color	Cream
Glass Transition Temperature	See Chart on page 3
Thermal Coefficient of Expansion	62 x 10 ⁻⁶ /°C (below T _g) 205 x 10 ⁻⁶ /°C (above T _g)
Thermal Conductivity*	0.80 - 1.4 W/m-°K
Thermal Impedance**	0.05°C in ² /W (2 mil)
Volume Resistivity	7.58 x 10 ¹² ohm-cm
Dielectric Strength	750 volts/mil
Dielectric Constant	4.6
Dissipation Factor	.09
Total Outgassing	<25 µg/g (GC/MS, 85°C/3 hours)
Hydrocarbon Outgassing	<25 µg/g (GC/MS, 85°C/3 hours)
Siloxane Outgassing	<5 µg/g (GC/MS, 85°C/3 hours)
Extractable Chloride	<30 µg/g (hexane extraction)

*Test method dependent.

**Impedance value corrected for interfacial impedance of test method.

3M™ Thermally Conductive Epoxy Adhesive TC-2810

Curing

Cure Schedule: 23°C / 24 hours
 50°C / 270 minutes
 70°C / 90 minutes
 90°C / 30 minutes
 120°C / 10 minutes

Note: The following technical information and data should be considered representative or typical only, and should not be used for specification purposes.

Shear Strength, Peel Strength, Tg vs. Cure Temperature/Time

	23°C (72°F) 24 hours	90°C (194°F) 30 minutes	120°C (248°F) 10 minutes
Overlap Shear (psi) (ASTM D-1002)	2700	2700	2700
T-Peel (plw) (ASTM D-1876)	7	7	7
Shore D Hardness	75	80	80
Tg (°C) Tan Delta	60	100	100

