

## Advanced Materials

# Kerimid® 8292 NPM 60

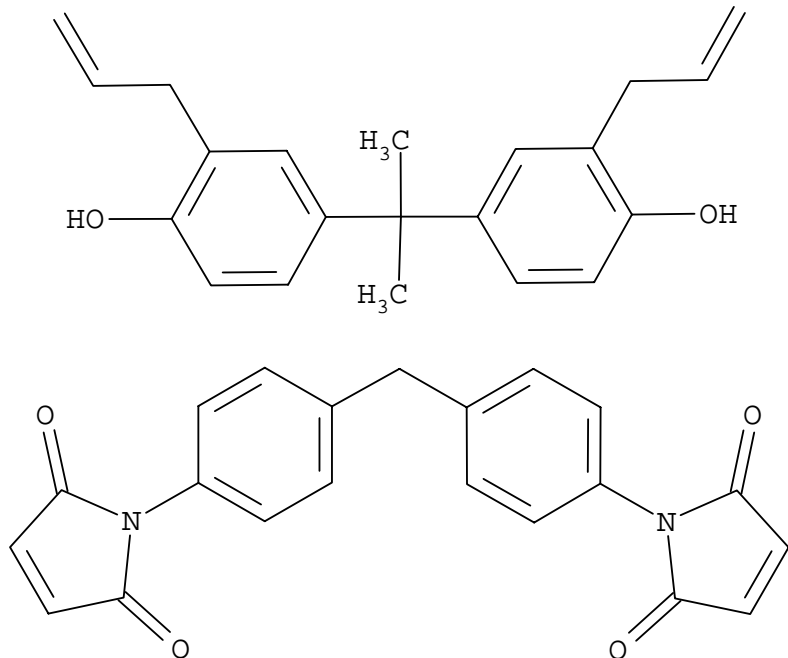
### HIGH PERFORMANCE BISMALLEIMIDE LAMINATING RESIN

**GENERAL**

Kerimid® 8292 NPM 60 is a single component, ready to use, polyimide resin solution for use in the manufacture of high temperature resistant electrical laminates and prepregs.

**CHEMICAL DESCRIPTION**

Kerimid® 8292 NPM 60 is a 60% by weight solids solution of a polyimide resin in methylethyl ketone and methoxy propanol. The base polyimide resin is a prepolymer formed by the reaction of the following two components:

**APPLICATIONS**

Laminates and prepregs for printed wiring boards for:  
High temperature environment  
Surface mount chip carriers  
High reliability applications

**ADVANTAGES**

Excellent toughness  
Good moisture and chemical resistance  
Non-MDA (methylene dianiline) hardener  
Excellent heat performance, T<sub>g</sub> 250 - 300°C (480 - 570°F)  
High peel strength at soldering temperature  
Low Z axis expansion and improved reliability

**TYPICAL PROPERTIES\***

Visual Appearance	Amber liquid
Color, Gardner, max	18
Solids, Wt. %	59.0 - 64.0
Solvents	methyl ethyl ketone/methoxy propanol 1:1 blend
Viscosity @ 25°C (77°F), mPa s (cPs)	100 - 600
Stroke cure, 171°C (340°F), sec	200 - 300
Specific gravity, solution	1.2
Specific gravity, solid content	1.23

\* Typical properties are based on Huntsman's test methods. Copies are available upon request.

**VARNISH PREPARATION**

Kerimid<sup>®</sup> 8292 NPM 60 is a single component, ready to use, polyimide solution. It does not require additional hardeners or catalysts. Viscosity of the varnish can be adjusted with a 1:1 blend of MEK and methoxy propanol to obtain the desired resin pick up. The following guideline can be used to adjust prepreg resin content. Simply mix solution before using.

Varnish Solids, %	Glass Style	Resin Pick-up, %
55 - 60	7628	35 - 45
55 - 58	116	50 - 60
50 - 52	108	60 - 70
44 - 48	106	70 - 80

A small amount of high boiling solvents may be incorporated to allow controlled evaporation rate in the treater.

**TREATER OPERATION**

As the Kerimid<sup>®</sup> 8292 NPM 60 impregnated web travels through the treater ovens, solvent volatilization is achieved in the first zone at 340-370°F. Further exposure to this temperature will cause advancement of prepreg resin, resulting in lowering of prepreg gel time and flow. Approximately 3-6 minutes residence time in the treater is required to produce prepregs with the following typical properties.

Glass Style	Resin Content	Dust Gel <sub>1</sub>	Mil Flow <sub>2</sub>	Scale Flow <sub>3</sub>	Volatiles <sub>3</sub>
7628	35 - 40%	80 sec; ±20	15 - 25%	-	1.5 - 2.0%
2116	48 - 52%	80 sec; ±20	20 - 32%	3.5 - 4.2	2.0 - 3.5%
2113	50 - 55%	80 sec; ±20	28 - 35%	-	2.0 - 3.5%
1080	59 - 64%	80 sec; ±20	39 - 45%	2.3 - 3.0	2.5 - 4.0%
106	62 - 66%	80 sec; ±20	40 - 50%	1.4 - 1.8	2.5 - 4.0%

1) Test done @ 171°C

2) As per Mil Spec 13949, section 2.3.17

3) Values are mils/ply as per Mil Spec 13949, section 2.4.38

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**LAMINATION CYCLE**

Kerimid® 8292 NPM 60 prepreg resin exhibits a lower melt viscosity than conventional MDA/BMI resins. This is an advantage in multilayer applications where the increased flow allows more complete encapsulation of the internal circuit layers. Care must be exercised, however, in manufacture of core materials to avoid excessive flow and dry laminate surface.

Both hot and cold press cycles can be used to laminate Kerimid® 8292 NPM 60 prepreps.

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**HOT PRESS CYCLE**

Lay-ups are loaded into a preheated press and lamination carried out using a dual pressure cycle.

**Parameters**

Low pressure, psi	20 - 30
High pressure, psi	300 - 400
Platen temperature	177° - 218°C (350° - 425°F)
Heat rise, min	8° - 10°C (15° - 18°F)
Time @ 177° - 219°C (350° - 425°F)	3 hrs.

**Procedure:**

1. Provide sufficient blotter board to control heat transfer to the desired rate.
2. Preheat press to 177° - 218°C (350° - 425°F) (steam, electric, or oil).
3. Load lay-ups into the press and close immediately to low pressure.
4. Hold at low pressure until load reaches an internal temperature of 138° - 160°C (280° - 320°F). Resin will increase in viscosity and will approach gelation.
5. Increase pressure to 300 - 400 psi and hold for three hours.
6. Cool load under full pressure to 66°C (150°F) or less.
7. Remove from press. Post-cure material per recommended schedule.

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**COLD PRESS CYCLE**

Lay-ups are loaded into a cold press, pressure increased to the desired ultimate value and platen temperature increased to the lamination temperature at controlled rate.

**Parameters**

Pressure, psi	300 - 400
Final platen temperature	177° - 218°C (350° - 425°F)
Heat rise, min	6° - 8°C (10° - 15°F)
Time @ 177° - 218°C (350° - 425°F)	3 hrs.

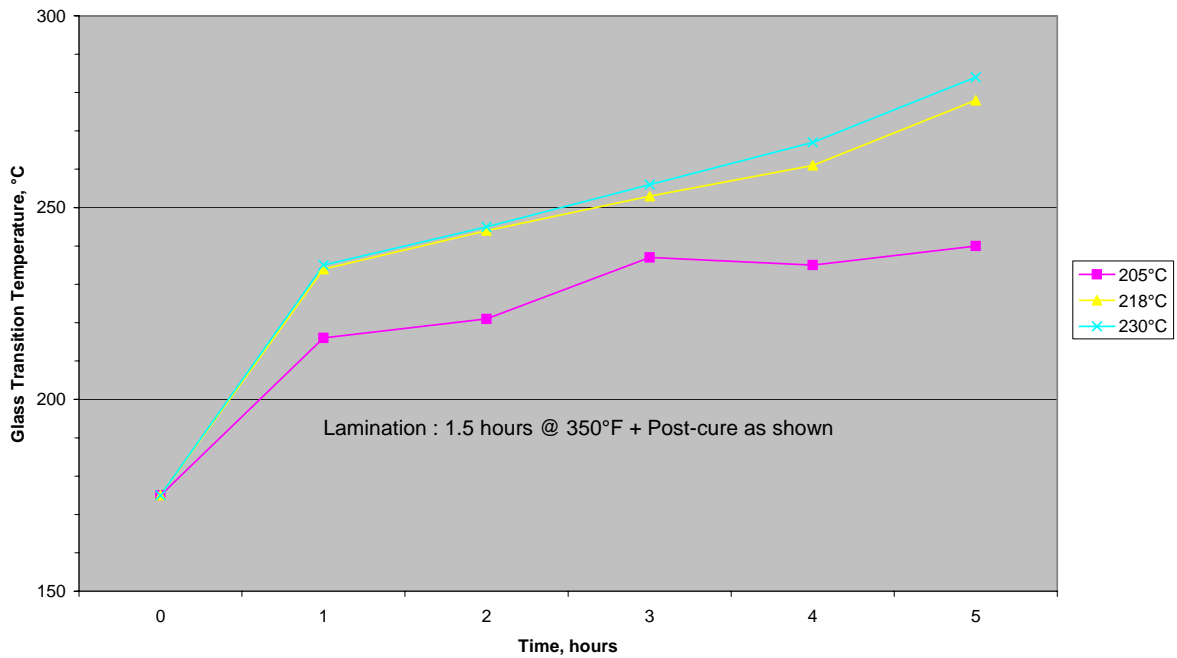
**Procedure**

1. Provide sufficient board to control heat transfer to the desired rate.
2. Load lay-ups into the press, close and apply ultimate pressure.
3. Start heat-up at the rate of 6° - 8°C (10° - 15°F) until the lay-ups reach lamination temperature (about 30 minutes).
4. Hold at lamination temperature for three hours.
5. Cool load under full pressure to 67°C (150°F) or less.
6. Remove from press. Post-cure material per recommended schedule.

## POST-CURE CYCLE

In order to obtain the ultimate thermal and physical properties, Kerimid<sup>®</sup> 8292 NPM 60 laminates will require post-cure. As shown in the figures below, the ultimate Tg will depend on the post-cure temperature and length of the cycle. If a higher lamination temperature 218°C (425°F) was used, this will allow a shorter post-cure cycle to achieve the same Tg than if lower lamination temperature 177°C (350°F) was used.

**Kerimid 8292 Cure  
TMA Expansion Analysis @ 10°C/m**



**Kerimid® 8292 NPM 60 LAMINATE  
PROPERTIES  
(8 Ply 7628, .062" Thick)**

<b>Mechanical Property</b>	<b>Units</b>	<b>Test Method</b>	<b>Kerimid® 8292 Value</b>
Ambient peel strength		MIL-P-13949	
Single and Double Treat	lbs/in	4.8.3.8	9 - 10
Brown Oxide	lbs/in		7 - 8
Flex strength		MIL-P-13949	
Warp	psi	4.8.3.16	74,000
Fill	psi		60,000
Flex modulus			
Warp	psi 10 <sup>6</sup>	DMA	3.13
Fill	psi 10 <sup>6</sup>	DMA	2.88
Modulus retention			
150°C	Percent	DMA	91.3%
250°C	Percent	DMA	72.0%

<b>Chemical Property</b>	<b>Units</b>	<b>Test Method</b>	<b>Kerimid® 8292 Value</b>
Methylene chloride absorption	% wt. gain	IPC 2.3.4.2	.041
Water absorption	% wt. gain	MIL-P-13949 4.8.3.11	0.88

<b>Thermal Property</b>	<b>Units</b>	<b>Test Method</b>	<b>Kerimid® 8292 Value</b>
Glass transition temperature	°C	IPC 2.4.24	260 - 300
Decomposition onset	°C	TGA	410
Coefficient of thermal expansion	10 <sup>-6</sup> /in/°C	IPC 2.4.41	(below Tg) 39 (above Tg) 144
Z-axis Solder dip	N/A	MIL-P-13949	No degradation
Pressure cooker	N/A	See below*	No delamination No blisters
Flammability	N/A	UL 94	V-1

\* - 062 unclad laminate 4" x 4" (250°F/1 hr, dessicator storage)  
 - 15 psi steam/2,4, and 6 hours exposure  
 - 20 seconds solder immersion @ 550°F

<b>Electrical Property</b>	<b>Units</b>	<b>Test Method</b>	<b>Kerimid® 8292 Value</b>
Dielectric constant	@ 1Mhz	MIL-P-13949 4.8.3.14	4.4
Dissipation factor	@ 1MHz	MIL-P-13949 4.8.3.14	.01
Volume resistivity	megaohms <sup>cm</sup>	MIL-P-13949	15x10 <sup>7</sup>
Surface resistivity	megaohms <sup>cm</sup>	MIL-P-13949	32x10 <sup>7</sup>

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**DRILLING OPERATION FOR  
Kerimid® 8292 NPM 60 LAMINATE****Recommendations**

Aluminum back-up and cover materials are recommended for drilling Kerimid® 8292 NPM 60 laminate. Avoid the use of epoxy or phenolic materials.

New carbide drills should be used. Do not sharpen.

Suggested drilling parameters are as follows:

Feed: 70 - 100 in/min

Speed: 35,000 - 100,000 RPM

Stack: 1 - 2 high

Number of hits per bit should be approximately 1,000. It is not recommended that the hits per bit exceeds 2,000.

Plasma etching is recommended for etchback.

Commercial permaganate chemistry can also be used.

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**PACKAGING & STORAGE**

This product is supplied in 450 pound drums. Kerimid® 8292 NPM 60 has a minimum shelf life of six months when stored in unopened sealed containers in a dry location at room temperature.

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**HANDLING/SAFETY  
PRECAUTIONS****Caution : Skin and eye irritant.**

Avoid contact with eyes, skin or clothing.

Avoid breathing vapor, mist or spray.

Use with adequate ventilation.

Wash after handling.

Store in tightly closed containers.

In accordance with good industrial practice, avoid unnecessary personal contact.

**Read Material Safety Data Sheet Before Using.  
For Industrial Use Only.****FIRST AID****In case of contact :**

**Eyes :** Promptly flush with water for at least 15 minutes.

**Skin :** Wash thoroughly with mild soap and water.

**Inhalation :** Remove to fresh air. If breathing is difficult, give oxygen.

**Ingestion :** If conscious, give water and get medical attention.

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