

## N4000-6

### High-Tg Multifunctional Epoxy Laminate & Prepreg

The Nelco N4000-6 high-Tg multifunctional epoxy series of materials was specifically designed to withstand most varieties and combinations of thermal excursions or PCB rework operations. It exhibits outstanding performance through a variety of assembly processes. N4000-6 is used in demanding applications such as high-layer count backplanes and high-density interconnects.

The versatility of the N4000-6 series is the result of high-Tg, low Z-axis expansion and improved thermal, mechanical and chemical properties. The N4000-6 series is designed to provide higher yields through fabrication and assembly.

Key applications for this material include backplanes, fine-line multilayers, surface-mount multilayers and high-density CSP attachment. End use applications include BGA multilayers, PCMCIA cards, wireless communications, infrastructure, network storage and high-end servers.

The N4000-6 has been a proven performer in many applications. It can withstand multiple solder shocks and has passed the stringent Q1000 requirement of thermal cycling for 1000 hours at -40°C to 125 °C. N4000-6 provides a wide rheology window for multilayer processing and has good drilling properties, especially in high-layer count designs.

The N4000-6 is vacuum laminated and available in a wide variety of constructions, copper weights and glass styles to meet the changing demands of today's PCB market. It is also available in standard copper, double-treat copper, RTFOIL® Laminate and ZBC 2000® formats

When your applications require a high performance multifunctional epoxy, the N4000-6 series of laminates and prepregs is a one-stop solution.

#### Product Application Environments

- Fine-Line Multilayers
- Backplanes
- Surface-Mount Multilayers
- BGA Multilayers
- CSP Attachment
- Automotive
- Underhood Automotive
- Wireless Communications
- Infrastructure
- Network Storage
- High-End Servers

#### Vacuum Lamination Parameters

Full Cure In Press	90 min. @ 182°C
Heat Up Rate (°C/min.)	4 - 7
Critical Range (°C)	65 - 120
Cool Down Rate (°C/min.)	< 3
Pressure (kg/cm <sup>2</sup> )/(psi) *	14 - 21 / 200 - 300

Set platen 3° C higher than cure temp. & control heat up rate through critical temperature range.

Partial cure in press is not recommended for this product.

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# N4000-6

## High-Tg Multifunctional Epoxy Laminate & Prepreg

Property / Condition	Value (U.S. Units)		Value (Metric Units)		Test Method
<b>Mechanical Properties</b>					
Peel Strength - 1 oz. (35 micron) Cu					
After Solder Float	9.0	lb/inch	1.58	N/mm	IPC-TM-650.2.4.8
At Elevated Temperature	7.0	lb/inch	1.23	N/mm	IPC-TM-650.2.4.8.2a
After Exposure to Process Solutions	9.0	lb/inch	1.58	N/mm	IPC-TM-650.2.4.8
X/Y CTE [-40°C to +125°C]	12 - 15	ppm/°C	12 - 15	ppm/°C	IPC-TM-650.2.4.41
Z Axis Expansion [50°C to 260°C]	3.9	%	3.9	%	IPC-TM-650.2.4.41
Young's Modulus (X/Y)	4.4/3.7	psi x 10 <sup>6</sup>	29.9/25.1	GN/m <sup>2</sup>	ASTM D3039
Poisson's Ratios (X/Y)	0.16/0.14		0.16/0.14		ASTM D3039
Thermal Conductivity	0.3 - 0.4	W/mK	0.3 - 0.4	W/mK	ASTM E1461-92
Specific Heat	1.2 - 1.4	J/gK	1.2 - 1.4	J/gK	ASTM E1461-92
<b>Electrical Properties</b>					
Dielectric Constant (50% resin content)					
@ 1 MHz (TFC/LCR Meter)	4.3		4.3		IPC-TM-650.2.5.5.3
@ 1 GHz (RF Impedance)	4.1		4.1		IPC-TM-650.2.5.5.9
@ 2.5 GHz (Stripline)	4.0		4.0		IPC-TM-650.2.5.5.5
Dissipation Factor (50% resin content)					
@ 1 MHz (TFC/LCR Meter)	0.023		0.023		IPC-TM-650.2.5.5.3
@ 2.5 GHz (Stripline)	0.022		0.022		IPC-TM-650.2.5.5.5
Volume Resistivity					
C - 96/35/90	10 <sup>8</sup>	MΩ - cm	10 <sup>8</sup>	MΩ - cm	IPC-TM-650.2.5.17.1
E - 24/125	10 <sup>7</sup>	MΩ - cm	10 <sup>7</sup>	MΩ - cm	IPC-TM-650.2.5.17.1
Surface Resistivity					
C - 96/35/90	10 <sup>7</sup>	MΩ	10 <sup>7</sup>	MΩ	IPC-TM-650.2.5.17.1
E - 24/125	10 <sup>7</sup>	MΩ	10 <sup>7</sup>	MΩ	IPC-TM-650.2.5.17.1
Electric Strength	1300	V/mil	5.1x10 <sup>4</sup>	V/mm	IPC-TM-650.2.5.6.2
Dielectric Breakdown	>50	kV	>50	kV	IPC-TM-650.2.5.6
Arc Resistance	65	seconds	65	seconds	IPC-TM-650.2.5.1
<b>Thermal Properties</b>					
Glass Transition Temperature (T <sub>g</sub> )					
DSC (°C)	175 *	°C	175 *	°C	IPC-TM-650.2.4.25c
TMA (°C)	170 *	°C	170 *	°C	IPC-TM-650.2.4.24c
Degradation Temp (TGA) (5% wt. loss)	325	°C	325	°C	IPC-TM-650.2.3.40
Pressure Cooker - 2 hour					IPC-TM-650.2.6.16
(10 second solder dip @ 288°C)	Pass		Pass		(modified)
T <sub>260</sub>	4 - 8	minutes	4 - 8	minutes	IPC-TM-650.2.4.24.1
<b>Chemical/Physical Properties</b>					
Moisture Absorption	0.1	wt. %	0.1	wt. %	IPC-TM-650.2.6.2.1
Methylene Chloride Resistance	0.7	% wt. chg.	0.7	% wt. chg.	IPC-TM-650.2.3.4.3
Density [50% resin content]	1.92	g/cm <sup>3</sup>	1.92	g/cm <sup>3</sup>	Internal Method

\* Tg nominal on laminates. Finished board value may be lower due to printed circuit processes.

All test data provided are typical values and not intended to be specification values. For review of critical specification tolerances, please contact a Nelco representative directly. Nelco reserves the right to change these typical values as a natural process of refining our testing equipment and techniques.

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\*CAF resistance has been established to greater than 500 hours using a specific OEM coupon design and test procedure. For details on this or other CAF tests, please visit [www.parkedro.com](http://www.parkedro.com).

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