

N4000-2

Multifunctional Epoxy Laminate & Prepreg

The most established material of the comprehensive Nelco product line is N4000-2. This system of multifunctional epoxy laminate and prepreg has one of the broadest operating and processing windows available. N4000-2 is widely used in a number of applications including fine-line and high density multilayer boards.

Designed for use in high-density multilayer boards, N4000-2 is suitable for surface-mount multilayers, MCM-Ls, direct chip attach, automotive and wireless communications. The characteristics of N4000-2 also make it particularly beneficial in high-volume, fine-line multilayers and PCMCIA applications.

The predictability and consistency of this material provides for tremendous ease of processing at the circuit board fabrication site, and its electrical and mechanical characteristics make it user friendly for both designers and fabricators of critical circuits.

As with all Nelco materials, the N4000-2 is vacuum laminated and is available in a wide variety of constructions, copper weights and glass styles. It is also available in standard copper, double-treat copper and our RTFOIL® Laminate.

N4000-2 is a reliable combination of managed cost, superior quality and consistent performance for a multitude of high volume applications.

Product Application Environments

- Fine-Line Multilayers
- Surface-Mount Multilayers
- CSP's
- MCM-Ls
- PCMCIA Cards
- Wireless Communications
- Bluetooth Modules
- Automotive

Vacuum Lamination Parameters

Full Cure In Press	45 min. @ 170°C
Heat Up Rate (°C/min.)	4 - 7
Critical Range (°C)	70 - 130
Cool Down Rate (°C/min.)	< 3
Pressure (kg/cm ²) / (psi)	15 - 20 / 200 - 300

Set platen 3 - 5° 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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Multifunctional Epoxy Laminate & Prepreg

Property / Condition	Value (U.S. Units)		Value (Metric Units)		Test Method
Mechanical Properties					
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 - 16	ppm/°C	12 - 16	ppm/°C	IPC-TM-650.2.4.41
Z Axis Expansion [50°C to 260°C]	4.5	%	4.5	%	IPC-TM-650.2.4.41
Young's Modulus (X/Y)	4.1/3.5	psi x 10 ⁶	24.8/23.4	GN/m ²	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
Electrical Properties					
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
Dissipation Factor (50% resin content)					
@ 1 MHz (TFC/LCR Meter)	0.023		0.023		IPC-TM-650.2.5.5.3
@ 1 GHz (RF Impedance)	TBD		TBD		IPC-TM-650.2.5.5.9
Volume Resistivity					
C - 96/35/90	10 ⁸	MΩ - cm	10 ⁸	MΩ - cm	IPC-TM-650.2.5.17.1
E - 24/125	10 ⁷	MΩ - cm	10 ⁷	MΩ - cm	IPC-TM-650.2.5.17.1
Surface Resistivity					
C - 96/35/90	10 ⁷	MΩ	10 ⁷	MΩ	IPC-TM-650.2.5.17.1
E - 24/125	10 ⁷	MΩ	10 ⁷	MΩ	IPC-TM-650.2.5.17.1
Electric Strength	1250	V/mil	4.9x10 ⁴	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
Thermal Properties					
Glass Transition Temperature (T _g)					
DSC (°C)	140	°C	140	°C	IPC-TM-650.2.4.25c
TMA (°C)	130	°C	130	°C	IPC-TM-650.2.4.24c
Degradation Temp (TGA) (5% wt. loss)	300	°C	300	°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 ₂₆₀	8 - 12	minutes	8 - 12	minutes	IPC-TM-650.2.4.24.1
Chemical / Physical Properties					
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 ³	1.92	g/cm ³	Internal Method

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.

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