

Nelco Advanced Circuitry Materials

Nelco® N4000-11

CAF Resistant, Low-CTE, High-Tg Multifunctional Epoxy Laminate & Prepreg



The Nelco® N4000-11 is a CAF* resistant, high Tg (175° C by DSC) multifunctional epoxy dielectric substrate. This material is formulated to provide the PWB manufacturer and OEM with vastly improved thermal, mechanical, and electrical performance in lead-free assembly and high layer count, sophisticated PWB designs.

Key Features

Tg 175°C, thermal stability and moisture resistance

- Lead-free assembly compatibility
- Suitable for high-layer count, sophisticated PWB designs

CAF Resistant

- Providing long term reliability in end products

Low Z-axis expansion

- Reduced expansion improves through-hole reliability

Dicyandiamide (DICY) free, proprietary resin chemistry

- Extremely low Z-CTE.
- Improved thermal stability, CAF and moisture resistance when compared to traditional FR-4

Superior electrical properties

- Supporting advanced technology PWB designs

Optimized FR-4 processing

- Superior rheology providing consistent controlled flow and superior via topography.
- 75 min press at 185°C and 200-300 psi

And Much More

- Vacuum laminated
- Available in a wide variety of constructions, copper weights and glass styles including standard copper, double treat and RTFOIL® laminate.
- Available as a 2 mil core product meeting the specifications of a capacitive laminate
- Meets UL 94V-0 and IPC-4101/28, /83, /98 and /99 specifications*
- All Nelco® materials are RoHS compliant.

* material also meets the specifications of the IPC-4101/26 unfilled slash sheet.

Applications

- Lead-Free Assembly Substrate
- Large Format Backplanes
- Tight Tolerance Via to Via Applications
- High I / O Count BGA Substrates
- Extreme Layer count Multilayers
- Lead-Free DCA Applications
- High Temperature Underhood Automotive
- Telecommunications Infrastructure
- Sophisticated Data Storage Applications

Global Availability

Nelco Products, Inc. (California) - Americas

+1.714.879.4293

Neltec, Inc. (Arizona) - Americas

+1.480.967.5600

Nelco Products Pte. Ltd. - Asia Pacific

+65.6861.7117

Neltec, S.A. - Europe

+33.562.98.52.90

www.parkelectro.com

info@parkelectro.com

Park's UL file number: E36295



PARK
ELECTROCHEMICAL
CORP.

Nelco N4000-11

CAF Resistant, Low-CTE, High-Tg 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 - 14	ppm / °C	12 - 14	ppm / °C	IPC-TM-650.2.4.41
Z Axis CTE Alpha 1 [50°C to T _g]	65	ppm / °C	65	ppm / °C	IPC-TM-650.2.4.24
Z Axis CTE Alpha 2 [T _g to 260°C]	265	ppm / °C	265	ppm / °C	IPC-TM-650.2.4.24
Z Axis Expansion [50°C to 260°C]	3.2	%	3.2	%	IPC-TM-650.2.4.24
Young's Modulus (X / Y)	4.4 / 3.7	psi x 10 ⁶	29.9 / 25.1	GN / m ²	ASTM D3039
Poisson's Ratios (X / Y)	0.16 / 0.14		0.16 / 0.14		ASTM D3039
Thermal Conductivity	0.4 - 0.6	W / mK	0.4 - 0.6	W / mK	ASTM E1461-92
Specific Heat	1.20 - 1.40	J / gK	1.20 - 1.40	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
@ 2.5 GHz (Stripline)	3.8		3.8		IPC-TM-650.2.5.5.5
Dissipation Factor (50% resin content)					
@ 1 MHz (TFC / LCR Meter)	0.016		0.016		IPC-TM-650.2.5.5.3
@ 2.5 GHz (Stripline)	0.020		0.020		IPC-TM-650.2.5.5.5
Volume Resistivity					
C - 96 / 35 / 90	10 ⁷	MΩ - cm	10 ⁷	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 ⁶	MΩ	10 ⁶	MΩ	IPC-TM-650.2.5.17.1
E - 24 / 125	10 ⁶	MΩ	10 ⁶	MΩ	IPC-TM-650.2.5.17.1
Electric Strength	1300	V / mil	5.1x10 ⁴	V / mm	IPC-TM-650.2.5.6.2
Dielectric Breakdown	>50	kV	>50	kV	IPC-TM-650.2.5.6
Arc Resistance	124	seconds	124	seconds	IPC-TM-650.2.5.1
Thermal Properties					
Glass Transition Temperature (T _g)					
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)	345	°C	345	°C	IPC-TM-650.2.4.24.6
Pressure Cooker - 60 min then solder dip					IPC-TM-650.2.6.16
@288°C until failure (max 10 min.)	Pass		Pass		(modified)
T ₂₆₀	30	minutes	30	minutes	IPC-TM-650.2.4.24.1
Chemical / Physical Properties					
Moisture Absorption	0.15	wt. %	0.15	wt. %	IPC-TM-650.2.6.2.1
Methylene Chloride Resistance	0.8	% wt. chg.	0.8	% wt. chg.	IPC-TM-650.2.3.4.3
Density [50% resin content]	1.96	g / cm ³	1.96	g / cm ³	Internal Method

Park Electrochemical Corp. is a global advanced materials company which develops and manufactures high-technology digital and RF/microwave printed circuit materials and advanced composite materials, parts and assemblies. The company operates under the Nelco®, Nelcote® and Nova™ names.

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.

Aeroglide™, CoreFix®, Easycure™, EF®, EP™, LD®, Mercurywave™, Nelco®, Nelcote®, Nova™, PeelCote™, RTFoil® and Si® are trademarks of Park Electrochemical Corp.

BC®, ZBC-2000® and Buried Capacitance™ are Trademarks of the Sanmina-SCI Corporation.

*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.parkelco.com.

Nelco reserves the right to make changes without further notice to any products herein to improve reliability, function or design. Nelco does not assume any liability arising out of the application or use of any product described herein; neither does it convey any license under its patent rights nor the rights of others. This disclaimer of warranty is in lieu of all warranties whether expressed, implied or statutory, including implied warranties of merchantability or fitness for a particular purpose.



PARK
ELECTROCHEMICAL
CORP.

Rev 9-12