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.
-- 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

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Park's UL file number: E36295

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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 Tg]	65	ppm / °C	65	ppm / °C	IPC-TM-650.2.4.24
Z Axis CTE Alpha 2 [Tg 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.

*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.parkelectro.com.

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