

N4000-12 N4000-12 SI®

High Speed / Low Loss, CAF Resistant Laminate & Prepreg



The Nelco N4000-12 series is an enhanced epoxy resin system designed for use in high speed, low loss applications requiring thermal stability, excellent signal speed and CAF resistance.

Key Features

Tg >190°C, robust thermal stability

- Lead-free assembly compatibility
- Designed for high-reliability assemblies demanding wide bandwidth and increased thermal performance
- T₂₆₀ >60 minutes
- Low Z-Axis CTE

High Speed and Low Loss Properties

- Appropriate for applications in the 1-10 GHz range
- Low Df and Dk allows for low signal distortion and faster signal propagation for high frequency and high reliability applications

CAF* Resistant

- The low Z-CTE and proven CAF resistance provide long-term reliability for both RF and digital applications

SI (Signal Integrity) option

- When used, SI glass provides enhanced electrical performance for even the most demanding applications

High-Tg FR-4 processing

- Processes similar to traditional high Tg FR-4 materials
- Provides excellent drilling
- Chemical desmear compatible
- 75 min press at 193°C and 200-300 psi.

Available in a variety of constructions

- Vacuum laminated
- Available in a wide variety of constructions, copper weights and glass styles including standard copper, double treat and RTFOIL® laminate.
- All Nelco and Neltec materials are RoHS compliant.

Applications

- Lead-Free Assemblies
- Fine-Line Multilayers
- Backplanes
- Surface-Mount Multilayers
- BGA Multilayers
- SIPs
- MCM-Ls
- Direct Chip Attach
- Network Storage
- Wireless Communication Infrastructure
- High Speed Computing

Global Availability

Contact Nelco or Neltec worldwide:

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N4000-12 and N4000-12 SI®

High Speed / Low Loss, CAF Resistant Laminate & Prepreg

Mechanical Properties	N4000-12	-12 SI	U.S. Units	N4000-12	-12 SI	Metric	Test Method
Peel Strength - 1 oz. (35 micron) Cu							
After Solder Float	9.2	9.2	lb/inch	1.61	1.61	N/mm	IPC-TM-650.2.4.8
At Elevated Temperature	8.7	8.7	lb/inch	1.53	1.53	N/mm	IPC-TM-650.2.4.8.2a
After Exposure to Process Solutions	9.3	9.3	lb/inch	1.62	1.62	N/mm	IPC-TM-650.2.4.8
X/Y CTE [-40°C to +125°C]	12 - 15.5	12 - 15.5	ppm/°C	12 - 15.5	12 - 15.5	ppm/°C	IPC-TM-650.2.4.41
Z Axis Expansion [50°C to 260°C]	3.6	3.6	%	3.6	3.6	%	IPC-TM-650.2.4.41
Young's Modulus (X/Y)	4.1/3.4	TBD	psi x 10 ⁶	28.3/23.4	TBD	GN/m ²	ASTM D3039
Poisson's Ratios (X/Y)	0.16/0.14	TBD		0.16/0.14	TBD		ASTM D3039
Thermal Conductivity	0.3 - 0.5	0.29	W/mK	0.3 - 0.5	0.29	W/mK	ASTM E1461
Specific Heat	1.20	1.14	J/gK	1.20	1.14	J/gK	ASTM E1461
Electrical Properties							
Dielectric Constant (50% resin content)							
@ 1 MHz (TFC/LCR Meter)	3.9	TBD		3.9	TBD		IPC-TM-650.2.5.5.3
@ 1 GHz (RF Impedance)	3.7	TBD		3.7	TBD		IPC-TM-650.2.5.5.9
@ 10 GHz (Stripline)	3.6	3.4		3.6	3.4		IPC-TM-650.2.5.5.5
@ 10 GHz (Split Post Cavity)	3.7	3.3		3.7	3.3		
Dissipation Factor (50% resin content)							
@ 1 MHz (TFC/LCR Meter)	0.010	TBD		0.010	TBD		IPC-TM-650.2.5.5.3
@ 2.5 GHz (Split Post Cavity)	0.008	TBD		0.008	TBD		
@ 10 GHz (Split Post Cavity)	0.008	0.007		0.008	0.007		
Volume Resistivity							
C - 96/35/90	10 ⁸	10 ⁸	MΩ - cm	10 ⁸	10 ⁸	MΩ - cm	IPC-TM-650.2.5.17.1
E - 24/125	10 ⁷	10 ⁸	MΩ - cm	10 ⁷	10 ⁸	MΩ - cm	IPC-TM-650.2.5.17.1
Surface Resistivity							
C - 96/35/90	10 ⁷	10 ⁷	MΩ	10 ⁷	10 ⁷	MΩ	IPC-TM-650.2.5.17.1
E - 24/125	10 ⁶	10 ⁶	MΩ	10 ⁶	10 ⁶	MΩ	IPC-TM-650.2.5.17.1
Electric Strength	1470	TBD	V/mil	5.8x10 ⁴	TBD	V/mm	IPC-TM-650.2.5.6.2
Dielectric Breakdown	>50	>50	kV	>50	>50	kV	IPC-TM-650.2.5.6
Arc Resistance	65	65	seconds	65	65	seconds	IPC-TM-650.2.5.1
Thermal Properties							
Glass Transition Temperature (T _g)							
DSC (°C)	190	190	°C	190	190	°C	IPC-TM-650.2.4.25c
TMA (°C)	180	180	°C	180	180	°C	IPC-TM-650.2.4.24c
DMA (°C) (Tan δ Peak)	210	210	°C	210	210	°C	IPC-TM-650.2.4.24.3
Degradation Temp (TGA) (5% wt. loss)	370	370	°C	370	370	°C	IPC-TM-650.2.3.40
Pressure Cooker-60 min then solder dip							IPC-TM-650.2.6.16
@288°C until failure (max 10 min.)	Pass	Pass		Pass	Pass		(modified)
T ₂₆₀	>60	>60	minutes	>60	>60	minutes	IPC-TM-650.2.4.24.1
Chemical/Physical Properties							
Moisture Absorption	0.09	0.09	wt. %	0.09	0.09	wt. %	IPC-TM-650.2.6.2.1
Methylene Chloride Resistance	1.0	1.0	% wt. chg.	1.0	1.0	% wt. chg.	IPC-TM-650.2.3.4.3
Density [50% resin content]	1.90	TBD	g/cm ³	1.90	TBD	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.parelelectro.com.

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