AGC

Your Dreams, Our Challenge

nelco

N4000-29

Advanced Lead-Free, High-Tg Multifunctional Epoxy

Laminate & Prepreg

Nelco N4000-29 is an advanced, lead-free, low-CTE, high Tg (185°C by DSC) multifunctional epoxy dielectric substrate. This material has been designed for use not only in standard multilayer PCB designs, but for today's toughest, high-performance, lead-free applications.

Key Features

Low Z-axis expansion
- Reduced expansion improves through-hole reliability
- Excellent for high layer count assemblies
- Designed to withstand multiple reflow excursions and repair operations

High Tg, excellent thermal stability and moisture resistance
- Improved lead-free assembly compatibility
- Proven IST testing results
- Exceptional peel strength
- Suitable for high-layer count, sophisticated PWB designs

CAF Resistant
- Providing long term reliability in end products

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
- Compatible with all Meteorwave products for hybrid applications to reduce package cost
- Vacuum laminated
- Available in a wide variety of constructions, copper weights and glass styles including standard copper, double treat and RTFOIL® laminate
- Available down to 1.2 mil core.
- Meets UL 94V-0 and IPC-4101/98, /99, /126 and /129 specifications
- RoHS compliant

Applications

- Advanced 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 Temp. Underhood Automotive
- Telecommunications Infrastructure
- Sophisticated Data Storage

UL file number: E36295

N4000-29

Advanced Lead-Free, High-Tg Multifunctional Epoxy Laminate and Prepreg

Property / Condition	Value (U.S. Units)		Value (Metric Units)		Test Method
Mechanical Properties					
Peel Strength - 1 oz. (35 micron) Cu					
After Solder Float	10.1	lb / inch	1.81	N / mm	IPC-TM-650.2.4.8
At Elevated Temperature	8.9	lb / inch	1.56	N / mm	IPC-TM-650.2.4.8.2a
After Exposure to Process Solutions	9.7	lb / inch	1.73	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 CTE Alpha 1 [50°C to Tg]	55	ppm / °C	55	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]	3.0	%	3.0	%	IPC-TM-650.2.4.24
Young's Modulus (X / Y)	3.6 / 2.9	psi x 10^6	22.6 / 18.2	GN / m^2	ASTM D3039
Poisson's Ratios (X / Y)	0.18 / 0.16		0.18 / 0.16		ASTM D3039
Thermal Conductivity	0.46	W / mK	0.46	W / mK	ASTM E1461-92
Specific Heat	0.92	J / gK	0.92	J / gK	ASTM E1461-92
Electrical Properties					
Dielectric Constant (50% resin content)					
@ 1 GHz (RF Impedance)	4.3		4.3		IPC-TM-650.2.5.5.9
@ 2 GHz (Stripline)	4.23		4.23		IPC-TM-650.2.5.5.5
@ 10 GHz (Stripline)	4.16		4.16		IPC-TM-650.2.5.5.5
Dissipation Factor (50% resin content)					
@ 2.5 GHz (Split Post Cavity)	0.015		0.015		
@ 10 GHz (Split Post Cavity)	0.017		0.017		
Volume Resistivity					
C - 96 / 35 / 90	10^7	MΩ - cm	10^7	MΩ - cm	IPC-TM-650.2.5.17.1
E - 24 / 125	10^8	MΩ - cm	10^8	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	10^7	MΩ	10^7	MΩ	IPC-TM-650.2.5.17.1
Electric Strength	1100	V / mil	$4.2x10^4$	V / mm	IPC-TM-650.2.5.6.2
Dielectric Breakdown	>50	kV	>50	kV	IPC-TM-650.2.5.6
Arc Resistance	129	seconds	129	seconds	IPC-TM-650.2.5.1
Thermal Properties					
Glass Transition Temperature (T_g)					
DSC (°C)	185	°C	185	°C	IPC-TM-650.2.4.25c
TMA (°C)	175	°C	175	°C	IPC-TM-650.2.4.24c
Degradation Temp (TGA) (5% wt. loss)	350	°C	350	°C	IPC-TM-650.2.4.24.6
Pressure Cooker - 60 min then solder dip @288°C until failure (max 10 min.)	Pass		Pass		IPC-TM-650.2.6.16 (modified)
T_{260}	>60	minutes	>60	minutes	IPC-TM-650.2.4.24.1
T_{288}	15	minutes	15	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	0.01	% wt. chg.	0.01	% wt. chg.	IPC-TM-650.2.3.4.3
Density [50% resin content]	1.99	g / cm^3	1.99	g / cm^3	Internal Method

*DMA is the preferred method for measuring Tg - other methods may be less accurate.

All test data provided are typical values and not intended to be specification values. For review of critical specification tolerances, please contact a company representative directly.