

N4350-13 RF N4380-13 RF

Microwave Performance, Modified Epoxy

The Neltec N4350-13 RF and N4380-13 RF series are enhanced epoxy resin systems specifically engineered to provide a unique solution for design applications that demand outstanding thermal properties, tight dielectric constant tolerances and low signal loss properties. These next generation modified epoxies combine tightly controlled RF electrical properties with the mechanical reliability and competitive advantages of FR-4.

Key Features

Tg >210°C, outstanding thermal, electrical and signal loss properties

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

CAF* Resistant

- Providing long term reliability in end products

Tightly controlled electrical properties

- Consistency in performance-sensitive applications
- Suitable for designs that would otherwise require PTFE or ceramic-loaded hydrocarbon materials
- Can be used for both the RF and the digital layers in hybrid multilayer applications

N4000-13 based material

- Industry standard material providing years of usage data
- Established UL 94 V-0 rating
- Well-known excellent electrical and loss properties
- Does not use expensive and abrasive ceramic fillers

High-Tg FR-4 processing

- Ease of processing through more conventional processes.
- 90 min press at 193°C and 275-350 psi.
- Most epoxy prepregs will adhere

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

- 802.11 a, b and g Antennas
- Automotive
- Power Amplifiers
- Hybrid RF Multilayers
- Telecommunications
- High Speed Computing
- Commercial RF Applications
- Lead-Free Assembly Substrates

Global Availability

Contact Nelco or Neltec worldwide:

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N4350-13 RF and N4380-13 RF

Microwave Performance, Modified Epoxy

Property / Condition	Value (U.S. Units)			Value (Metric Units)			Test Method
	N4350-13	N4380-13	U.S. Units	N4350-13	N4380-13	Metric	
Mechanical Properties							
Peel Strength - 1 oz. (35 micron) Cu							
After Solder Float	7.5	7.5	lb/inch	1.31	1.31	N/mm	IPC-TM-650.2.4.8
At Elevated Temperature	8.1	8.1	lb/inch	1.42	1.42	N/mm	IPC-TM-650.2.4.8.2a
After Exposure to Process Solutions	9.0	9.0	lb/inch	1.58	1.58	N/mm	IPC-TM-650.2.4.8
X/Y CTE [-40°C to +125°C]	10 - 14	10 - 14	ppm/°C	10 - 14	10 - 14	ppm/°C	IPC-TM-650.2.4.41
Z Axis Expansion [50°C to 260°C]	3.5	3.5	%	3.5	3.5	%	IPC-TM-650.2.4.41
Thermal Conductivity	0.350	0.350	W/mK	0.350	0.350	W/mK	ASTM E1461
Specific Heat	1.20	1.20	J/gK	1.20	1.30	J/gK	ASTM E1461
Electrical Properties							
Dielectric Constant							
@ 10 GHz (Stripline)	3.5	3.8		3.5	3.8		IPC-TM-650.2.5.5.5
Dissipation Factor							
@ 10 GHz (Stripline)	0.0065	0.007		0.0065	0.008		IPC-TM-650.2.5.5.5
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 ⁷	MΩ - cm	10 ⁷	10 ⁷	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 ⁷	10 ⁷	MΩ	10 ⁷	10 ⁷	MΩ	IPC-TM-650.2.5.17.1
Electric Strength	1200	1200	V/mil	4.7x10 ⁴	4.7x10 ⁴	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	123	123	seconds	123	123	seconds	IPC-TM-650.2.5.1
Thermal Properties							
Glass Transition Temperature (T _g)							
DSC (°C)	210	210	°C	210	210	°C	IPC-TM-650.2.4.25c
TMA (°C)	200	200	°C	200	200	°C	IPC-TM-650.2.4.24c
DMA (°C) (Tan δ Peak)	240	240	°C	240	240	°C	IPC-TM-650.2.4.24.3
Degradation Temp (TGA) (5% wt. loss)	365	365	°C	365	365	°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	>50	>50	minutes	>50	>50	minutes	IPC-TM-650.2.4.24.1
T ₂₈₈	>8	>8	minutes	>8	>8	minutes	IPC-TM-650.2.4.24.1
Chemical/Physical Properties							
Moisture Absorption	0.1	0.1	wt. %	0.1	0.1	wt. %	IPC-TM-650.2.6.2.1
Methylene Chloride Resistance	0.7	0.7	% wt. chg.	0.7	0.7	% wt. chg.	IPC-TM-650.2.3.4.3
Density [50% resin content]	1.77	1.77	g/cm ³	1.77	1.77	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.parkelco.com.

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