AGC
Your Dreams, Our Challenge

N4350-13 RF & N4380-13 RF

Microwave Performance, Modified Epoxy

Laminate & Prepreg

N4350-13 RF and N4380-13 RF 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
- 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

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-4101/29 specifications
- 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

UL file number: E36295

N4350-13 RF & N4380-13 RF

Microwave Performance, Modified Epoxy Laminate and Prepreg

Mechanical Properties	N4350-13	N4380-13	U.S. Units	N4350-13	N4380-13	Metric	Test Method
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	IPC-TM-650.2.4.41
Z Axis Expansion [50°C to 260°C]				3.5	3.5	%	IPC-TM-650.2.4.24
Thermal Conductivity				0.350	0.350	W / mK	ASTM E1461
Specific Heat				1.20	1.30	J / gK	ASTM E1461
Electrical Properties							
Dielectric Constant							
@ 10 GHz (Stripline)	3.57	3.8		3.57	3.8		IPC-TM-650.2.5.5.5
Dissipation Factor							
@ 10 GHz (Stripline)	0.009	0.009		0.009	0.009		IPC-TM-650.2.5.5.5
Volume Resistivity							
C - 96 / 35 / 90				10^8	10^8	MΩ - cm	IPC-TM-650.2.5.17.1
E - 24 / 125				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)	410	410	°F	210	210	°C	IPC-TM-650.2.4.25c
TMA (°C)	392	392	°F	200	200	°C	IPC-TM-650.2.4.24c
DMA (°C) (Tan d Peak)	464	464	°F	240	240	°C	IPC-TM-650.2.4.24.3
Degradation Temp (TGA) (5% wt. loss)	662	662	°F	350	350	°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		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	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.

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