

Park Advanced Circuitry Materials

NL9000

PTFE Laminates

The NL9000 PTFE laminate system is designed for critical RF/Microwave components, antennas, power amplifiers and subassemblies. Superior mechanical and electrical performance make the NL9000 PTFE laminate system the material of choice for your lowest loss, high frequency applications.

Key Features

Controlled dielectric constants and very low loss

- Dk of 2.94 through Dk of 3.50
- The first reinforced PTFE laminate with 2.94 - 3.50 dielectric constants with very low loss of 0.0017 for high frequency designs
- Exceptional directivity and gain

High Reliability

- Dimensional stability for efficient PCB processing
- Standard PTFE PCB through hole processing
- Temperature and humidity stable Dk and Df performance
- High heat resistance and lead-free assembly compatibility

Consistent Quality

- Statistic Process Control "SPC" methods provide consistent dielectric values from sheet to sheet and lot to lot
- Park's facilities are ISO 9001:2000 quality certified and comply to ISO 14001:2004 environmental regulations
- Meets UL 94V-0 and IPC-4103 specifications
- All of Park's materials are RoHS compliant

Optimized NL9000 PTFE processing

- Foil adhesion is 50-100% greater than competitive glass reinforced PTFE laminates and 200-300% greater than other ceramic loaded hydrocarbon laminates.
- Superior solvent absorption resistance compared to ceramic-loaded PTFE
- Reduced dielectric constant changes due to solvent absorption and no additional baking cycles are needed during processing



Applications

- Automotive Applications
 - Forward Warning and Near Field Radar
- Microwave Links
- Satellite Communications
- Antennas
- Wireless Communications
- Power Amplifiers
- Millimeter Wave Components
- Dual Band Hi Power Passive Circuits
- Digital/Microwave Hybrid Multilayer PCB Assemblies

Global Availability

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Park's UL file number: E36295



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NL9000 - Typical Engineering Values

Typical Parameter	NL SERIES	Test Method
Dielectric Constant at 10 GHz (Dk)	2.94 - 3.50	IPC-TM-650, 2.5.5.5
Dissipation Factor at 10 GHz (Df)	0.0017	IPC-TM-650, 2.5.5.5
PIM Formulation Availability	Yes	
Pressure Cooker-60 min then solder dip @288°C until failure (max 10 min)	Pass	IPC-TM-650, 2.6.16 (modified)
Dielectric Breakdown	>50kV	IPC-TM-650, 2.5.6
Volume Resistivity	6.1x10 ⁷ MΩ - cm	IPC-TM-650, 2.5.17.1
Surface Resistivity	4.4x10 ⁶ MΩ - cm	IPC-TM-650, 2.5.17.1
Arc Resistance	215 sec.	IPC-TM-650, 2.5.1
Flexural Strength Lengthwise	58.6 MPa	IPC-TM-650, 2.4.4.0
Tensile Strength (warp/fill)	64.1 / 48.9 MPa	ASTM D3039
Copper Peel Strength - 35 μm (1 oz)	1.8 kN / m 10.3 lb/in	IPC-TM-650, 2.4.8
Modulus (warp)	1.1 x 10 ⁶ MPa	ASTM D3039
Moisture Absorption	<0.05%	IPC-TM-650, 2.6.2.1
Specific Gravity	2.25 g / cm ³	
Thermal Conductivity	0.381 W / m / K	ASTM E1461
Coefficient of Thermal Expansion (CTE)		
X	25 ppm / °C	
Y	35 ppm / °C	
Z	320 ppm / °C	IPC-TM-650, 2.4.24
Flammability	V-0	IPC-TM-650, 2.3.10
Poisson's Ratio (warp/fill)	0.180 / 0.221	ASTM D3039

Cladding - Copper Foil

Foil Weight	Foil Thickness		Copper Type
	Microns	Inches	
.33 oz	12	0.00045	CT
.50 oz	18	0.00067	RH
1 oz	35	0.00134	R1
2 oz	70	0.00268	R2

Panel Sizes mm (in)

610x457 (24x18)

305x457 (12x18)

Other sizes available upon request.

Product Thicknesses

Product	Dk	Df	Thickness Offerings mm (in.)
NL9294	2.94±.05	0.0017	0.127 (0.005), 0.254 (0.010), 0.508 (0.020), 0.762 (0.030), 0.787 (0.031)
NL9300	3.00±.05	0.0017	0.127 (0.005), 0.254 (0.010), 0.508 (0.020), 0.762 (0.030), 0.787 (0.031)
NL9320	3.20±.05	0.0017	0.508 (0.020), 0.762 (0.030), 0.787 (0.031)
NL9350	3.50±.05	0.0017	0.508 (0.020), 0.762 (0.030), 0.787 (0.031)

Other thicknesses available upon request.

Ordering Information

Please specify the product and / or Dk, material thickness, copper thickness, copper type and panel size.

Example: NL9294, 0.254 mm thick, 35 micron RTF 2 sides, 305x457 mm.



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