25N/25FR®

Microwave Materials

High Frequency, Low Loss Thermoset Laminates and Prepreg for Double Sided, Multilayer and Mixed Dielectric Printed Circuit Boards

Arlon 25N® and 25FR® are woven fiberglass reinforced, ceramic filled composite materials for use as printed circuit board substrates. These materials combine the low dielectric constant properties of a thermosetting, non-polar organic resin system with the low expansion properties of ceramic filler. The combination is designed for high performance commercial circuits where high costs of PTFE materials are prohibitive, yet instability, electrical loss, and other shortcomings of traditional thermoset materials are unacceptable. 25FR materials also meet requirements of UL94V-0.

The low dielectric constant ($\in_r$) and loss properties, low thermal coefficient of dielectric constant ($TC\in_r$), and excellent physical stability characteristics offered by 25N and 25FR materials make them ideal for wireless and digital applications such as cellular telephones, down converters, low noise amplifiers, antennas — and other advanced design circuits.

Processing for 25N and 25FR materials is consistent with processing for standard high temperature thermoset based printed circuit board substrates.

Availability:

25N and 25FR materials are available in rigid, thin copper-clad laminates or B-stage bonding plies (prepregs), making them ideal for single- and double-sided PWBs and complex multilayer circuits including dual offset stripline circuitry. Laminates are supplied with 1/2, 1, or 2 ounce electrodeposited copper on both sides. Other copper weights and rolled copper foil are available. Prepreg is available in rolls or precut panels.

		25N	25FR	Tolerance
Standard Laminate Thickness		0.0060	0.0060	± 0.0007
		0.0080	0.0080	± 0.0010
		0.0100	0.0100	± 0.0010
		0.0120	0.0120	± 0.0015
		0.0180	0.0180	± 0.0020
		0.0200	0.0200	± 0.0020
		0.0240	0.0240	± 0.0020
		0.0300	0.0300	± 0.0030
		0.0600	0.0580	± 0.0040
Prepreg	106	0.0020	0.0020	
	1080	0.0039	0.0037	
	2112	0.0057	0.0056	

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Typical Properties: 25N and 25FR Low Loss Laminates

Properties	Test Method	Condition	25N	25FR
Dielectric Constant @10GHz	IPC TM-650 2.5.5.5	C23/50	3.38	3.58
Dissipation Factor @10GHz	IPC TM-650 2.5.5.5	C23/50	0.0025	0.0035
Thermal Coefficient of E_r (ppm/°C)	IPC TM-650 2.5.5.5 Adapted	-10°C to +140°C	-87	50
Volume Resistivity (MΩ-cm)	IPC TM-650 2.5.17.1	A	1.98 E9	4.17 E8 (12 mil)
Surface Resistivity (MΩ)	IPC TM-650 2.5.17.1	A	4.42 E8	8.9 E8 (12 mil)
Tensile Strength (kpsi)	ASTM D-882	A, 23°C	16.1	14
Flexural Strength (psi)	ASTM D-790	A, 23°C	30195	35024
Specific Gravity (g/cm^3)	ASTM D-792 Method A	A, 23°C	1.7	1.8
Water Absorption (%)	IPC TM-650 2.6.2.1	E1/105 + D24/23	0.09	0.09
Coefficient of Thermal Expansion (ppm/°C) X Axis Y Axis Z Axis	IPC TM-650 2.4.24	Before Tg	 15 15 52	 16 18 59
Thermal Conductivity (W/mK)	ASTM E-1225	100°C	0.4	0.4
Outgassing Total Mass Loss (%) Collected Volatile Condensable Material (%) Water Vapor Recovered (%) Visible Condensate (±)	ASTM E-595-90 Maximum 1.00% Maximum 0.10%	125°C, ≤ 10^{-6} torr	 0.17 0.01 0.02	 0.24 0.00 0.07
Flammability UL File E 80166	UL 94 Vertical Burn IPC TM-650 2.3.10	C48/23/50, E24/125	N/A	UL94V-0

Data based on 0.060" dielectric thickness, exclusive of metal cladding except where indicated by test method. Results listed above are typical properties; they are not to be used as specification limits. The above information creates no expressed or implied warranties. The properties of 25N and 25FR laminates may vary depending on the application.

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