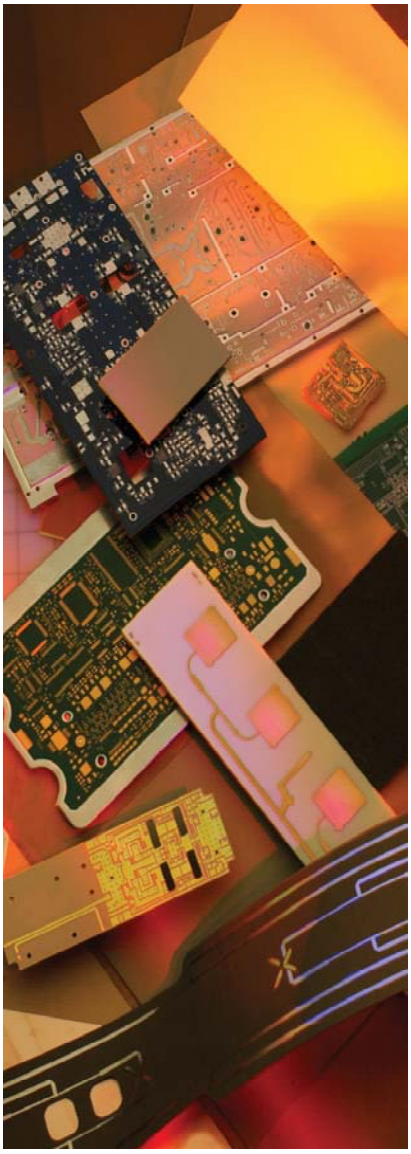
55NT

Epoxy Nonwoven Aramid Laminate And Prepreg



55NT is an epoxy laminate and prepreg system, reinforced with a non-woven aramid substrate. This system combines compatibility with lead-free processing, using a high-temperature epoxy resin, with the low in-plane (x,y) expansion and outstanding dimensional stability of non-woven aramid reinforcement.

Features:

- Low in-plane (x,y) expansion of 6-9 ppm/°C allows attachment of SMT devices with minimal risk of solder joint failure due to CTE mismatch
- Nonwoven aramid organic reinforcement provides outstanding dimensional stability and enhanced registration for improved multilayer yields
- Tg of 170°C, decomposition temperature of 368°C, and z-expansion of 3.5% between 50-260°C ensures compatibility with most lead-free processes
- Polymeric reinforcement results in PCBs typically 25% lighter in weight than conventional glass-reinforced laminates
- Laser and plasma ablatable for high speed formation of microvias and other features as small as 25µm
- Electrical and mechanical properties meeting the requirements of IPC-4101/55
- Compatible with lead-free processing
- RoHS/WEEE compliant

Typical Applications:

- Military and commercial avionics, missiles and missile defense, satellites, and other high-reliability SMT applications requiring low in-plane (x,y) CTE values
- Other applications requiring low in-plane (x,y) CTE values, including chip carriers and multichip modules, where the chip carrier serves as an interposer for attachment to the underlying PCB
- PCBs that are subjected to elevated temperatures during processing, such as lead-free soldering

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Typical Properties:

55NT

Property	Units	Value	Test Method
1. Electrical Properties			
Dielectric Constant *(may vary with Resin %)*			
@ 1 MHz	-	3.8	IPC TM-650 2.5.5.3
@ 1 GHz	-		IPC TM-650 2.5.5.9
Dissipation Factor			
@ 1 MHz	-	0.015	IPC TM-650 2.5.5.3
@ 1 GHz	-		IPC TM-650 2.5.5.9
Volume Resistivity			
C96/35/90	MΩ-cm	2.3×10^7	IPC TM-650 2.5.17.1
E24/125	MΩ-cm	6.6×10^7	IPC TM-650 2.5.17.1
Surface Resistivity			
C96/35/90	MΩ	1.8×10^8	IPC TM-650 2.5.17.1
E24/125	MΩ	1.6×10^8	IPC TM-650 2.5.17.1
Electrical Strength	Volts/mil (kV/mm)	1240 (48.8)	IPC TM-650 2.5.6.2
Dielectric Breakdown	kV		IPC TM-650 2.5.6
Arc Resistance	sec	165	IPC TM-650 2.5.1
2. Thermal Properties			
Glass Transition Temperature (Tg)			
TMA	°C		IPC TM-650 2.4.24
DSC	°C	170	IPC TM-650 2.4.25
Decomposition Temperature (Td)			
Initial	°C	351	IPC TM-650 2.3.41
5%	°C	368	IPC TM-650 2.3.41
T260	min	>60	IPC TM-650 2.4.24.1
T288	min	>60	IPC TM-650 2.4.24.1
T300	min	28	IPC TM-650 2.4.24.1
CTE (x,y)	ppm/°C	6-9	IPC TM-650 2.4.41
CTE (z)			
< Tg	ppm/°C	99	IPC TM-650 2.4.24
> Tg	ppm/°C	259	IPC TM-650 2.4.24
z-axis Expansion (50-260°C)	%	3.5	IPC TM-650 2.4.24
3. Mechanical Properties			
Peel Strength to Copper (1 oz/35 micron)			
After Thermal Stress	lb/in (N/mm)	3.6 (0.6)	IPC TM-650 2.4.8
At Elevated Temperatures	lb/in (N/mm)	3.6 (0.6)	IPC TM-650 2.4.8.2
After Process Solutions	lb/in (N/mm)	3.6 (0.6)	IPC TM-650 2.4.8
Young's Modulus	Mpsi (GPa)	2.0 (13.8)	IPC TM-650 2.4.18.3
Flexural Strength	kpsi (MPa)	38 (262)	IPC TM-650 2.4.4
Tensile Strength	kpsi (MPa)	36 (248)	IPC TM-650 2.4.18.3
Compressive Modulus	kpsi (MPa)		ASTM D-695
Poisson's Ratio (x, y)	-		ASTM D-3039
4. Physical Properties			
Water Absorption (0.062")	%	0.3	IPC TM-650 2.6.2.1
Specific Gravity	g/cm^3	1.38	ASTM D792 Method A
Thermal Conductivity	W/mK	0.2	ASTM E1461
Flammability	class	V-0	UL-94

Results listed above are typical properties, provided without warranty, expressed or implied, and without liability. Properties may vary, depending on design and application. Arlon reserves the right to change or update these values.

Availability:

Arlon Part Number	Glass Style	Resin %	Mil/Ply	Flow %
55NT147	E210	49	1.9	12
55NT247	E220	49	3	12
55NT347	E230	49	1.9	12
55NT153	E210	53	2.3	25
55NT253	E220	53	3.6	25
55NT353	E230	53	5	25
55NT165	E210	65		
55NT265	E220	63		
55NT365	E230	63		

Recommended Process Conditions:

Process inner-layers through develop, etch, and strip using standard industry practices. Use brown oxide on inner layers. Adjust dwell time in the oxide bath to ensure uniform coating. Bake inner layers in a rack for 60 minutes at 107°C - 121°C (225°F - 250°F) immediately prior to lay-up. Vacuum desiccate the prepreg for 8 - 12 hours prior to lamination.

Lamination Cycle:

1) Pre-vacuum for 30 - 45 minutes

2) Control the heat rise to 4.5°C – 6.5°C (8°F – 12°F) per minute between 82°C and 138°C (180°F and 280°F)

Panel Size		Pressure	
in	cm	psi	kg/sq cm
12 x 12	40 x 40	250	17
12 x 18	40 x 46	275	19
16 x 18	30 x 46	350	25
18 x 24	46 x 61	400	27

3) Product temperature at start of cure = 182°F (360°C).

4) Cure time at temperature = 90 minutes

5) Cool down under pressure at ≤ 6°C/min (10°F/min)

Drill at 350-400 SFM. Undercut bits are recommended for vias 0.023" (0.9cm) and smaller

De-smear using alkaline permanganate or plasma with settings appropriate for epoxy; plasma is preferred for positive etchback

Conventional plating processes are compatible with 55NT

Standard profiling parameters may be used; chip breaker style router bits are not recommended

Bake for 1 - 2 hours at 121°C (250°F) prior to solder reflow or HASL

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