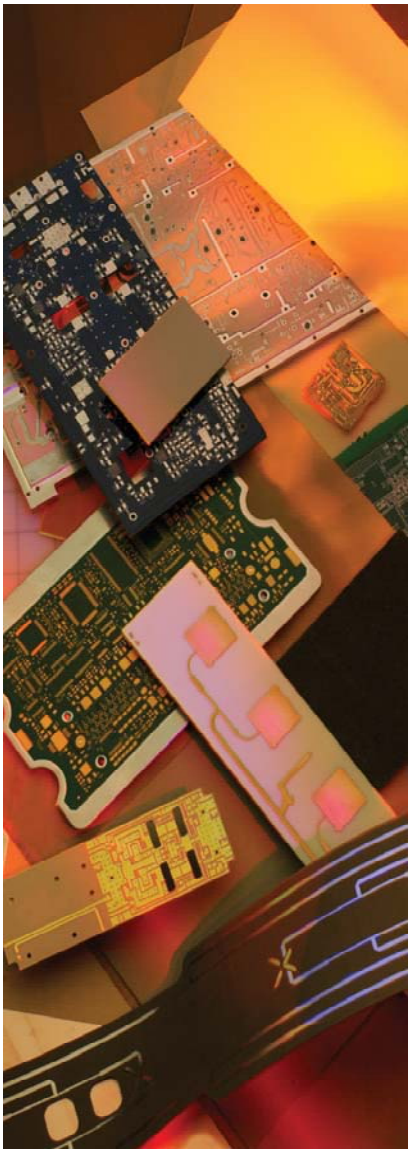
55ST

Epoxy Nonwoven Aramid Laminate And Prepreg



55ST is an epoxy laminate and prepreg system, reinforced with non-woven aramid fiber, with significantly improved peel strength due to a tight interpenetrating polymer network within the aramid base matrix.

Features:

- Low in-plane (x,y) expansion of 8-10 ppm/°C allows attachment of SMT devices with minimal risk of solder joint failure due to CTE mismatch
- Significantly higher peel strength than most epoxy/aramid products due to interpenetrating polymer network that creates high internal cohesive strength between epoxy resin and aramid fibers
- Nonwoven aramid fiber organic reinforcement provides enhanced dimensional stability for improved multilayer yields
- 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
- RoHS/WEEE compliant
- Recently converted to “E-Series” Thermount® for improved CTE control

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
- SMT applications requiring higher peel strengths, such as handheld devices or other applications where high g-forces may be present
- 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

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Typical Properties:

55ST

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	-	0.022	IPC TM-650 2.5.5.3
@ 1 GHz	-		IPC TM-650 2.5.5.9
Volume Resistivity			
C96/35/90	MΩ-cm	4.5×10^7	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	2.9×10^8	IPC TM-650 2.5.17.1
E24/125	MΩ	2.4×10^8	IPC TM-650 2.5.17.1
Electrical Strength	Volts/mil (kV/mm)	1540 (60.6)	IPC TM-650 2.5.6.2
Dielectric Breakdown	kV		IPC TM-650 2.5.6
Arc Resistance	sec	154	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	296	IPC TM-650 2.4.24.6
5%	°C	309	IPC TM-650 2.4.24.6
T260	min	6	IPC TM-650 2.4.24.1
T288	min	0	IPC TM-650 2.4.24.1
T300	min	0	IPC TM-650 2.4.24.1
CTE (x,y)	ppm/°C	8 - 10	IPC TM-650 2.4.41
CTE (z)			
< Tg	ppm/°C	122	IPC TM-650 2.4.24
> Tg	ppm/°C	279	IPC TM-650 2.4.24
z-axis Expansion (50-260°C)	%	4.2	IPC TM-650 2.4.24
3. Mechanical Properties			
Peel Strength to Copper (1 oz/35 micron)			
After Thermal Stress	lb/in (N/mm)	8.0 (1.3)	IPC TM-650 2.4.8
At Elevated Temperatures	lb/in (N/mm)	8.0 (1.3)	IPC TM-650 2.4.8.2
After Process Solutions	lb/in (N/mm)	8.0 (1.3)	IPC TM-650 2.4.8
Young's Modulus	Mpsi (GPa)	2.0 (14)	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	%	0.3	IPC TM-650 2.6.2.1
Specific Gravity	g/cm^3	1.35	ASTM D792 Method A
Thermal Conductivity	W/mK	0.2	ASTM E1461
Flammability	class	V-0	UL-94

Availability:

Arlon Part Number	Glass Style	Resin %	Mil/Ply	Flow %
55ST153	E210	53	1.9	15
55ST253	E220	53	3	15
55ST353	E230	53	4	15
55ST165	E210	65	2.3	25
55ST263	E220	63	3.6	25

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°C (360°F).

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 55ST

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

North America:
9433 Hyssop Drive, Rancho Cucamonga, California 91730
Tel: (909) 987-9533 • Fax: (909) 987-8541

1100 Governor Lea Road, Bear, Delaware, 19701
Tel: (302) 834-2100, (800) 635-9333
Fax: (302) 834-2574

Northern Europe:
44 Wilby Avenue, Little Lever, Bolton, Lancaster, BL31QE, UK
Tel/Fax: (44) 120-457-6068

Southern Europe:
1 Bis Rue de la Remarde, 91530 Saint Cheron, France
Tel: (33) 871-096-082 • Fax: (33) 164-566-489

Arlon Material Technologies
No. 20 Datong Road, Export Processing Zone, Suzhou New & High District, Jiangsu, China
Tel (86) 512-6269-6966
Fax: (86) 512-6269-6038

Arlon Electronic Materials (Suzhou) Co., Ltd.
Building 7, Da Xing Industrial Park of Suzhou New & High District
Jinangsu, China 21500
Tel: (86) 512-6672-1698
Fax: (86) 512-6672-1697

Eastern China:
Room 11/401, No. 8, Hong Gu Road, Shanghai, China, 200336
Tel/Fax: (86) 21-6209-0202

Southern China:
Room 601, Unit 1, Building 6, Liyuanxincun, Road Holiday,
Hua qiaocheng, Nanshan District, Shenzhen City, China
Tel: (86) 755-26906612 • Fax: (86) 755-26921357

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