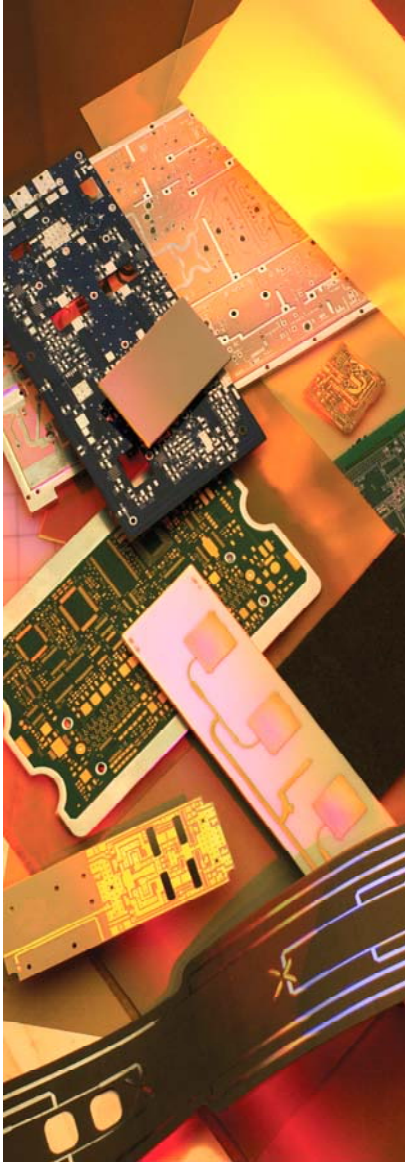


55LM

EPOXY NONWOVEN ARAMID LAMINATE AND PREPREG



55LM is an epoxy laminate and prepreg system, reinforced with non-woven aramid fiber, with substantially lower moisture absorption compared with conventional epoxy/aramid products, even in high-humidity environments.

Features:

- Low in-plane (x,y) expansion of 10-12 ppm/°C allows attachment of SMT devices with minimal risk of solder joint failure due to CTE mismatch
- Substantially lower moisture absorption than most epoxy/aramid products – almost equivalent to epoxy/glass products – resulting in significantly reduced baking requirements and higher reliability in high-humidity environments
- Nonwoven aramid 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

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
- HDI applications requiring cost-effective laser or plasma microvia formation

Typical Properties:

55LM

Property	Units	Value	Test Method
1. Electrical Properties			
Dielectric Constant <i>(may vary with Resin %)</i>			
@ 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		IPC TM-650 2.5.17.1
E24/125	MΩ-cm	1 x 10 ¹⁰	IPC TM-650 2.5.17.1
Surface Resistivity			
C96/35/90	MΩ		IPC TM-650 2.5.17.1
E24/125	MΩ	1 x 10 ⁹	IPC TM-650 2.5.17.1
Electrical Strength	Volts/mil (kV/mm)	>1250 (>49.2)	IPC TM-650 2.5.6.2
Dielectric Breakdown	kV		IPC TM-650 2.5.6
Arc Resistance	sec		IPC TM-650 2.5.1
2. Thermal Properties			
Glass Transition Temperature (Tg)			
TMA	°C		IPC TM-650 2.4.24
DSC	°C	160	IPC TM-650 2.4.25
Decomposition Temperature (Td)			
Initial	°C	328	IPC TM-650 2.4.24.6
5%	°C	337	IPC TM-650 2.4.24.6
T260	min	>60	IPC TM-650 2.4.24.1
T288	min	1	IPC TM-650 2.4.24.1
T300	min	0	IPC TM-650 2.4.24.1
CTE (x,y)	ppm/°C	10 - 12	IPC TM-650 2.4.41
CTE (z)			
< Tg	ppm/°C	98	IPC TM-650 2.4.24
> Tg	ppm/°C	353	IPC TM-650 2.4.24
z-axis Expansion (50-260°C)	%	4.5	IPC TM-650 2.4.24
3. Mechanical Properties			
Peel Strength to Copper (1 oz/35 micron)			
After Thermal Stress	lb/in (N/mm)	6 (1.0)	IPC TM-650 2.4.8
At Elevated Temperatures	lb/in (N/mm)		IPC TM-650 2.4.8.2
After Process Solutions	lb/in (N/mm)		IPC TM-650 2.4.8
Young's Modulus	Mpsi (GPa)		ASTM D638
Flexural Strength	kpsi (MPa)	2.1 (14)	IPC TM-650 2.4.4
Tensile Strength	kpsi (MPa)	40 (276)	IPC TM-650 2.4.18.3
Compressive Modulus	kpsi (MPa)	30 (207)	ASTM D-695
Poisson's Ratio (x, y)	-		ASTM D-3039
4. Physical Properties			
Water Absorption (0.062)	%	0.2	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 %
55LM7253	2N710	53	1.9	15
55LM7265	2N710	65	2.3	25
55LM7353	3N710	53	3	15
55LM7363	3N710	63	3.6	25
55LM7453	4N710	53	4	15
55LM7463	4N710	63	5	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 $\leq 6^{\circ}\text{C}/\text{min}$ ($10^{\circ}\text{F}/\text{min}$)

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 55LM

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

55LM

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