



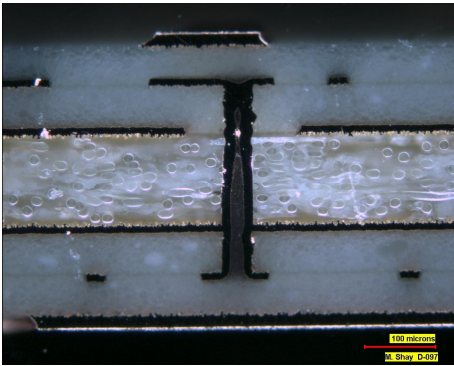
THE POWER OF EI

Pramid Epoxy (Laminate)

Pramid is a Driclad[®] epoxy laminate and prepreg system reinforced with non-woven para-aramid fibers. This material has substantially lower moisture absorption than conventional epoxy/aramid products.

Typical end uses include military and commercial avionics, missile defense, satellites and other high reliability SMT applications which require low in-plane CTE values. Examples include semiconductor packaging and system-in-package (SiP), which serve as interposers for attachment to the underlying PCB and high density interconnect PCBs, which contain laser microvias.

Pramid is an excellent Thermount[®] replacement and is available as a laminate or a B-stage prepreg.



Pramid laminate core in a 2-4-2 CoreEZ[™] Cross-section

Features & Benefits

- Low Coefficient of Thermal Expansion (CTE) Reduces CTE mismatch of substrates, devices and assembled components and increases solder joint reliability
- Weight/Density Aramid is lower in density than E-glass and approximately 25% lighter than equivalent E-glass dielectrics
- Laser Drillable Excellent performance under laser machining allows for very small microvia formation and plating
- Smooth Surface Para-aramid paper eliminates electrical loss and speed problems associated with glass knuckles often found in conventional glass based laminates
- Lower Dielectric Constant The low permittivity of the non-woven aramid reinforcement provides faster signal propagation
- Assembly Friendly Exhibits robust behavior through numerous high temperature assembly operations
- IPC 4101B/55 Meets industry standard electrical and mechanical requirements

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EI Pramid/Epoxy Properties

Property Tested		Test Method
Electrical		
Permittivity (Dielectric Constant @1 MHz)	3.65	ASTM-D-150-98
Loss Tangent (Loss Factor @ 1 MHz)	0.014	ASTM-D-150-98
Thermal Stress	Pass	IPC-TM-650/2.4.13.1
Electrical Strength (kV/mm)	82.2 kV/mm	IPC-TM-650/2.5.6.2
Dielectric Breakdown (kV)	> 45kV	IPC TM-650/2.5.6
Arc Resistance (Seconds)	78.2	IPC TM-650/2.5.1
Volume Resistivity (megohm-cm)		IPC-TM-650/2.5.17.1
After Moisture	2.7x10 ⁷	
At Elevated Temperature	3.7x10 ⁷	
Surface Resistivity (megohm)		IPC-TM-650/2.5.17.1
After Moisture	2.5x10 ⁵	
At Elevated Temperature	5.8x10 ⁶	
Thermal		
Glass Transition Temperature (°C), (Minimum)	172	IPC-TM-650/2.4.25
Thermal Conductivity, W/mK	0.3	
Decomposition Temperature (°C)	330	IPC-TM-650/2.4.24.6
Flammability	Pass *	UL94-V0
Out Gassing- Total Mass Lost, (TML)%	0.16	ASTM E595-93
Physical		
Resin Type	Multifunctional Epoxy	
Tensile Modulus	1.72Mpsi / 11.86GPa	
Tensile Strength	25.6Kpsi / 176.5MPa	
Peel Strength	6.2Lb/in / 109N/mm	IPC-TM-650/2.4.8.2
Flexural Strength		IPC-TM-650/2.4.4
Length Direction	43.7Kpsi / 301MPa	
Cross Direction	41.1Kpsi / 283MPa	
CTE Below Tg (X,Y) (ppm/C)	<18	IPC-TM-650/2.4.41
CTE Above Tg (Z) (ppm/C)	90	IPC-TM-650/2.4.41
Pressure Vessel Test (4hr.)	pass	IPC-TM-650/2.6.16
Moisture, % Gain (24 hr/RT)	0.44	IPC-TM-650/2.6.2.1

* The flame retardant in EI Pramid epoxy is TBBPA (RoHS compliant)