85NT & 55NT

Electronic Substrates

THERMOUNT® Laminate & Prepreg For Printed Wiring Boards

55RT

THERMOUNT® RT™ Laminate & Prepreg For HDI Printed Wiring Boards

Applications:

- MCM-L
- FINE PITCH SMT
- PCMCIA
- BGA
- µBGA
- CSP
- DIRECT CHIP ATTACH
- LCCC
- TSOP
- MICROVIA

Features:

- Lightweight
- High Interconnect Density
- Low Dielectric Constant
- Improved and Repeatable Dimensional Stability
- Low Melt Viscosity for Ease of Lamination
- Economical CTE Control
- Smooth Surface
- Laser/Plasma Ablatable
- Standard PWB Fabrication
- Drills Similarly to FR-4
- Reduced Drill Wander
- Thin Dielectrics

Arlon is a Licensed Laminator of THERMOUNT® and THERMOUNT®RT™

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85NT

Non-MDA Polyimide on THERMOUNT® Reinforcement

Arlon 85NT is a unique combination of Non-MDA Pure Polyimide resin coated on DuPont Type E-200 Series non-woven aramid reinforcement. The resin system has a Tg of 250ºC. The combination of the resin system and the non-woven reinforcement develops a Tg more in the range of 235-245ºC with conventional polyimide cure cycles. This material is designed for performance reliability in large scale packaging applications where conventional woven glass substrates are prone to solder joint cracking under thermal and power cycling due to CTE mismatch between the mounted devices (such as LCCC and other high I/O count devices) and the conventional woven glass composites as well as for lower Z-axis CTE for thicker MLB's. 85NT is commonly used to replace boards containing Copper-Invar-Copper in traditional CTE matched environments.

55NT

Multifunctional Epoxy on THERMOUNT® Reinforcement

Arlon 55NT is a unique combination of multifunctional epoxy (Tg 180ºC) on DuPont Type E-200 Series non-woven aramid reinforcement with a resin content of 49%. This material is designed for performance reliability with various interconnect packages: BGA (ball grid array), TSOP (thin small outline package), FP-SMT (fine patch surface mount technology), where conventional substrates are more prone to solder joint cracking under thermal and power cycling due to CTE mismatch of the mounted devices.

55RT

Multifunctional Epoxy on THERMOUNT®RT™ Reinforcement

Arlon 55RT is a special combination of multifunctional epoxy (Tg 180ºC) on DuPont Type N710 Series non-woven aramid reinforcement with a resin content of 53%. The material is designed for performance reliability in those applications which utilize laser or plasma formed microvia technology. This substrate is also designed for packaging applications with various interconnect packages: BGA (ball grid array), TSOP (thin small outline package), FP-SMT (fine pitch surface mount technology) & CSP (chip scale package) where conventional substrates are more prone to solder joint cracking under thermal and power cycling due to CTE mismatch of the mounted devices. Layer to layer circuit techniques can be combined with conventional FR4 (epoxy glass) cores utilizing High Density Interconnect Microvia Technologies.

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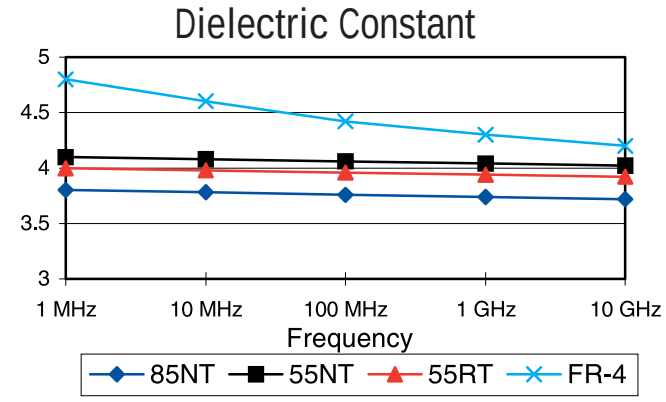
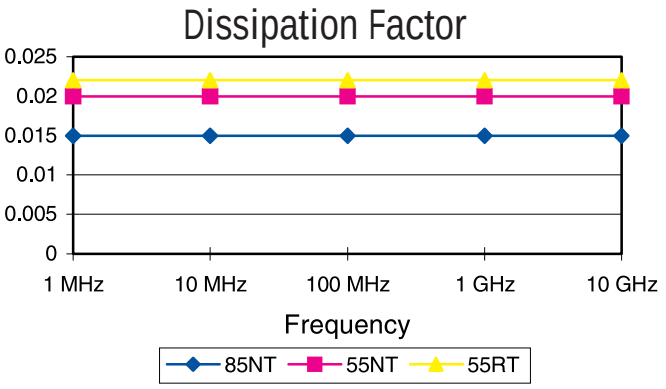
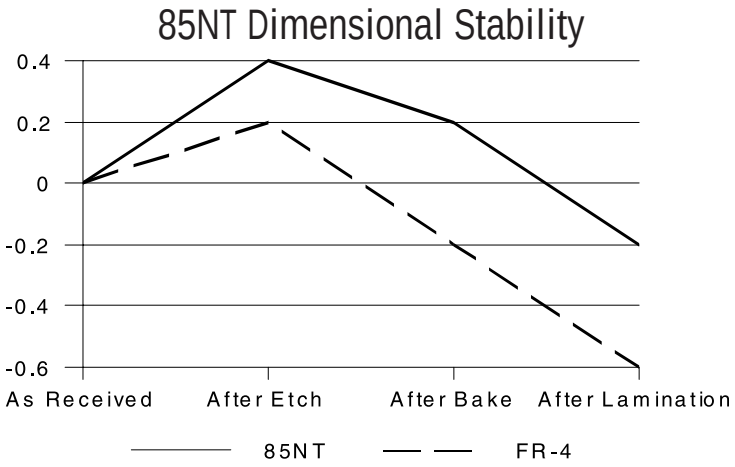


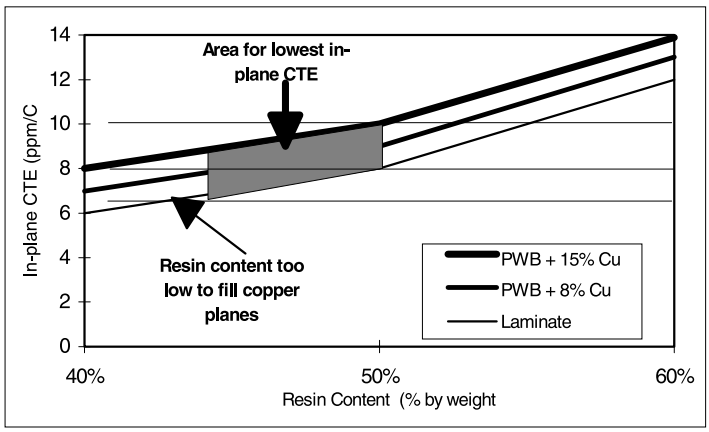
The dielectric constant of aramid reinforced products is not only consistent across all constructions and thicknesses, but also over a wide frequency range. This means predictable and stable performance for impedance control and etched circuit components for almost any design. Stable dielectric constants also mean there will be no surprises as new designs come along operating at different frequencies. Your expected design rules still apply.



The dissipation factor of the products is also stable over frequency providing the same trustworthy design rules that are afforded by the dielectric constant.



Excellent control and predictability of dimensional stability can be expected of these materials. This chart shows a comparison of aramid reinforced products on top vs. FR-4 on the bottom using the IPC methods with some additional experimentation. On actual production PWB's, we consistently measure about .0003 inch/inch of shrinkage time after time. Slightly less is observed with solid copper planes or laminate cap layers. 55RT may have slightly more movement due to it's higher resin content but all products are very predictable. Once the scale factors are tuned in, little variability will occur.



Non-woven aramid materials provide a low in-plane CTE. The copper content (% by volume) of the finished PWB will drive the expansion higher. In order to keep the CTE as low as possible, the percentage of total copper should be kept to a minimum. The chart at the left shows the effect of copper content in typical PWB's.

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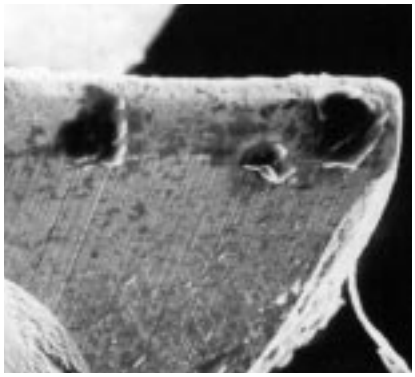
Detailed process guidelines are available for 85NT, 55NT, 55RT

Drilling advantages: drill wear is reduced so tool life is dramatically increased. Time and cost savings can be significant. Hole quality remains consistent from the first hole through the last. Drill wander is also reduced due to the random fiber distribution eliminating high density bundle areas. This further enables smaller holes, pads, and increased density of the wiring.

New Carbide Tool



After 4000 hits on FR-4

After 4000 hits on non-woven aramid laminate

Laser ablation of vias is an excellent method for producing vias of less than .010 inch. It is a clean and very fast process of producing thousands of vias within minutes with no variation from hole to hole. Registration is held to within the tolerance of the photo tools and etch tolerances of your current process. The copper foil acts as the laser mask by etching the copper where you want the holes formed. Some lasers (YAG) can also be used to simultaneously form holes in the copper and the dielectric, automatically aligning to innerlayer registration points.

Utilizing laser via formation methods allows blind and buried via structures to be easily implemented and formed with very small hole diameters. This allows for higher density circuit routing than previously possible. Fewer layers are possible due to smaller hole sizes and more available area for signal traces.

Typical Properties: Non-Woven Aramid Reinforced Laminates

Properties	Test Method	Condition	85NT	55NT	55RT
Coefficient of Thermal Expansion (ppm/°C) X axis Y axis Z axis	IPC-TM-650 Method 2.4.41	25°C to 125°C	 6 - 9 6 - 9 80 - 90	 7 - 9 7 - 9 110 - 120	 10 - 12 10 - 12 110
Tg (°C) (TMA)	IPC-TM-650 2.4.25		240 - 245	170	170
Peel Strength (lb/in, N/mm)	IPC-TM-650 2.4.8	A 23	3.5, 0.6	4.0, 0.7	5.5, 0.96
Solder Float	IPC-TM-650 2.4.23	10 sec. @ 550°F 60 sec. @ 550°F	Pass Pass	Pass Pass	Pass Pass
Dielectric Constant (@ 1 MHz)	IPC-TM-650 2.5.5.3	C23/50	3.8	4.0	4.0
Dissipation Factor (@ 1 MHz)	IPC-TM-650 2.5.5.3	C23/50	.015	.018	.019
Volume Resistivity (megohm-cm)	IPC-TM-650 2.5.17.1	C23/50 C96/35/90	$>1.0 \times 10^3$ $>1.0 \times 10^6$	$>1.0 \times 10^3$ $>1.0 \times 10^6$	$>1.0 \times 10^3$ $>1.0 \times 10^6$
Surface Resistivity (megohm)	IPC-TM-650 2.5.17.1	C23/50 C96/35/90	$>1.0 \times 10^3$ $>1.0 \times 10^4$	$>1.0 \times 10^3$ $>1.0 \times 10^4$	$>1.0 \times 10^3$ $>1.0 \times 10^4$
Electric Strength (volts/mil)	IPC-TM-650 2.5.6.2		1300	1500	1500
Water Absorption (%)	IPC-TM-650 2.6.2.1	E1/105 + D24/23	0.60	0.45	0.32
Thermal Conductivity (W/mK)	ASTM E-1225	50°C	0.25	0.18	0.18
Tensile Strength (Mpa, Kpsi)	ASTM D-3039	A, 23°C	114, 16.5	250, 36.3	220, 32
Tensile Modulus (Gpa, Mpsi)	ASTM D-3039	A, 23°C	15.6, 2.26	14, 2.03	14.5, 2.1
Flexural Strength (Mpa, Kpsi)	ASTM D-790	A, 23°C	234, 34	260, 37.7	289, 42
Flexural Modulus (Gpa, Mpsi)		A, 23°C	7.3, 1.06	13, 1.89	14.5, 2.1
Shear Modulus (Gpa, Mpsi)	ASTM D-3039	A, 23°C	4.8, 0.7	4.66, 0.68	4.66, 0.68
Specific Gravity (g/cm^3)	ASTM D-792	A, 23°C	1.25	1.3	1.3
Laminate Smoothness (Å)			2200	2200	2200
Flammability UL File E 80166	IPC-TM-650 2.3.10, UL 94	C48/23/50 E24/125	----	94V0	94V0

Data based on 0.062" 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 may vary depending on the application.

Prepreg:

Prepreg is available for all resin systems and is available in 3 different thicknesses. Reinforcement style E210 provides a dielectric thickness of about 1.8 mils per ply. Style E220 provides 3.0 mils per ply. Style E230 provides a thickness of 3.8 mils per ply. Style 2.0N710 provides a thickness of about 1.9 mils per ply. Style 3.0N710 provides 3.0 mils per ply and Style 4.0N710 provides 4.0 mils per ply. These products have several distinguishing features compared to conventional materials. One key is the consistency from one style to the next. The resin to reinforcement ratio is the same for all prepreg styles so any combination will result in consistent laminate performance across different constructions and thicknesses.

Resin Type	Arlon P/N	MIL-S-13949 Designation	Reinforcement	Resin Content	Thickness Mils Per Ply	Flow
Polyimide	85NT147	PBINA10xxxx49	E210	49%	1.8	7%
Polyimide	85NT247	PBINA16xxxx49	E220	49%	3.1	7%
Polyimide	85NT347	PBINA20xxxx49	E230	49%	3.9	7%
MF Epoxy	55NT147	PBFNA10xxxx49	E210	49%	1.7	12%
MF Epoxy	55NT247	PBFNA16xxxx49	E220	49%	3.0	12%
MF Epoxy	55NT347	PBFNA20xxxx49	E230	49%	3.8	12%
MF Epoxy	55RT7253	PBFNA10xxxx53	2.0N710	53%	1.9	15%
MF Epoxy	55RT7353	PBFNA16xxxx53	3.0N710	53%	3.0	15%
MF Epoxy	55RT7453	PBFNA20xxxx53	4.0N710	53%	4.0	15%

Laminates:

Laminates are available in sheet sizes up to 36” x 48”. Standard foil claddings are 1/2 ounce and 1 ounce copper. Other foils are available upon request. HTE type foil is standard for all of these products. Talk to our Technical Service Engineers about the impact that thicker foils have on your design. Common laminate thicknesses are .005, .006, .008, and .010 inches. Actual nominal values will be slightly different. Larger sheet sizes may be available. Please discuss your specific needs and applications with our Sales Engineers or Customer Service Representatives.

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