

ARLON

MATERIALS FOR ELECTRONICS DIVISION



**MICROWAVE & RF MATERIALS
GUIDE**



RF & Microwave Materials Guide

Arlon Microwave Materials specializes in products made from fluoropolymers (i.e. PTFE), ceramic-filled fluoropolymers, ceramic-filled hydrocarbon thermosets, and other materials that deliver the electrical performance needed in frequency-dependent circuit applications. These products are supplied as copper-clad laminates with bonding plies, or prepregs, for production of multilayer printed circuits. Arlon has over 55+ years of experience in microwave materials, today providing products that are used to make combiner boards and feed networks for microwave applications as well as basestation antennas and power amplifier boards for the wireless telecommunications infrastructure market.

Our facilities in California, Delaware and China employ state-of-the-art production equipment, engineered to provide cost-effective, flexible manufacturing capacity to permit quick response to customer requirements while meeting the most stringent quality and tolerance demands. Both of our manufacturing sites are ISO 9001: 2000 registered, and through rigorous quality control practices and commitment to continuous improvement, we are dedicated to meeting and exceeding our customer's requirements.

To better service our global customer base, Arlon created the venture, Arlon Material Technologies Co, Ltd. in Suzhou, Jiangsu Province, China. This venture includes both a Finishing Center and a manufacturing facility. The finishing center is located in Suzhou and has been operational since mid-2004. The Manufacturing Facility opened in October 2006. This facility contains a new, State-Of-The-Art Vacuum Press that has capability to laminate both High Temperature PTFE Microwave Laminates as well as High Performance Polyimide and Low-loss Thermoset Based Electronic Substrates. This facility is equipped with the highest degree of process control in the industry.

A lower cost, higher performance, lower loss series of products have been launched in the 2.55 to 3.20 range. These AD "A" Series include AD255A, AD260A, AD300A and others. These microwave Laminates utilize ceramic technologies to reduce loss and tighten tolerances. They are well suited for Base Station Antennas, Satellite Radio Antennas and Power Amplifiers where low loss is critical. These products are a significant improvement in cost/performance over traditional PTFE/Glass based laminates,

One of our most exciting products is a lower loss version of CLTE, called CLTE-Xt. CLTE-Xt has the lowest loss, lowest thermal expansion, highest phase stability, and lowest moisture absorption of any product in its class. It is truly "Best-in-Class." Further innovations in new low loss materials are also targeted in the near future and Arlon remains committed to the development of advanced materials targeted for high performance circuit boards and electronics.

Arlon maintains a significant commitment to research & development. Exciting recent products include the Thermally Conductive PTFE-based laminates, TC600 and TC350. These materials provide "Best-in-Class" Thermal Conductivity (W/m°C) for applications where temperature extremes are normal and Heat Rejection is a Primary Consideration. These materials Lower Junction Temperatures for Improved Power Amplifier Reliability and pull heat away from critical solder joints that can fatigue through cycling. TC600 and TC350 also offer greater Thermal Phase Stability for applications that are cycled and still need to maintain tight dielectric constant tolerances for phase sensitive circuitry.

RF & Microwave Materials Guide

This guide covers typical properties for a wide variety of Arlon’s microwave material products, ranging from our high performance PTFE laminates to our cost-optimized PTFE and non-PTFE based RF laminates and composites. Although a complete summary of Arlon’s capabilities and full product-line is not feasible, this guide provides a good overview of the core microwave material products that Arlon produces and covers typical properties as well as the wide variety of standard product options as far as laminate thicknesses and nominal dielectric constants. To reduce complexity and confusion, the following information represents the standard and common items.

Please contact Customer Service if you do not see your desired thickness or dielectric constant or require additional assistance. For more detail on a specific product, please refer to the product specific datasheet available on-line at www.arlon-med.com.

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Typical properties are listed in this guide are for reference purposes only; they are not to be used as specification limits. This information creates no expressed or implied warranties. The properties of Arlon laminates may vary depending on the design and application.



NEXT GENERATION MICROWAVE MATERIALS

PRODUCT OVERVIEW

Product	Composition	Dielectric Constant @ 10 GHz	Dissipation Factor @ 10 GHz	Thermal Coefficient of Expansion (ppm/°C)	Coefficient of Thermal Expansion (ppm/°C)			Typical Peel Strength (lbs)	Water Absorption (%)	Specific Gravity (unitless) or Density (g/cm ³)	Thermal Conductivity (W/mK)	NASA Outgassing		Flammability UL Rating
					X	Y	Z					Total Mass Loss (%)	Collected Volatile (%)	

CLTE-XT, CLTE-AT and CLTE High Performance, Excellent Dielectric Constant Control and Phase Stability with Temperature

CLTE-XT	Glass, PTFE and Micro-Dispersed Ceramic	2.94 *	0.0012	-9	8	8	20	7.2	0.02	2.02	0.56	0.02	0.00	UL94-V0
CLTE-AT	Glass, PTFE and Micro-Dispersed Ceramic	3.00	0.0013	-10	8	8	20	6.5	0.03	2.06	0.64	0.02	0.00	UL94-V0
CLTE	Glass, PTFE and Micro-Dispersed Ceramic	2.98 *	0.0025	-9	10	12	35	7	0.04	2.38	0.50	0.02	0.00	UL94-V0

AD "A" Series - Lower Loss and Improved Performance over Traditional AD Series. Woven Glass, PTFE and Micro-Dispersed Ceramic

AD250A	Glass, PTFE and Micro-Dispersed Ceramic	2.50	0.0015	-140	12	15	95	14	0.04	2.25	0.28	NT	NT	UL94-V0
AD255A	Glass, PTFE and Micro-Dispersed Ceramic	2.55	0.0015	-138	16	16	80	12	0.04	2.30	0.30	NT	NT	UL94-V0
AD260A	Glass, PTFE and Micro-Dispersed Ceramic	2.60	0.0017	-78	12	15	65	14	0.1	2.30	0.30	NT	NT	UL94-V0
AD300A	Glass, PTFE and Micro-Dispersed Ceramic	3.00	0.002	-110	12	12	125	13	0.02	2.10	0.49	NT	NT	UL94-V0
AD320A	Glass, PTFE and Micro-Dispersed Ceramic	3.20	0.0032	-125	14	14	128	14	0.02	2.09	0.45	NT	NT	UL94-V0
AD350A	Glass, PTFE and Micro-Dispersed Ceramic	3.50	0.003	-55	5	9	35	17	0.1	2.10	0.45	0.02	0.02	UL94-V0

High Thermal Conductivity, Excellent Dielectric Constant Control and Phase Stability with Temperature

TC350	Glass, PTFE and Micro-Dispersed Ceramic	3.50	0.0025	-10	8	8	17	8	0.03	3.20	1.03	0.02	0.01	UL94-V0
TC600	Glass, PTFE and Micro-Dispersed Ceramic	6.15	0.0020	-75	9	9	35	8	0.03	3.20	1.1(z), 1.4(x,y)	0.02	0.00	UL94-V0

High Dielectric Constant for Circuit Miniaturization & Patch Antenna Applications

AD410	Glass, PTFE and Micro-Dispersed Ceramic	4.10	0.003	-55	9	9	40	17	0.06	2.10	0.46	NT	NT	UL94-V0
AD430	Glass, PTFE and Micro-Dispersed Ceramic	4.30	0.003	-55	9	9	40	17	0.06	2.10	0.46	NT	NT	UL94-V0
AD440A	Glass, PTFE and Ceramic, 0.0125" Thick	4.40	0.003	-200	10	10	40	12	0.06	2.50	0.40	NT	NT	UL94-V0
AD450	Glass, PTFE and Micro-Dispersed Ceramic	4.50	0.0035	-233	8	11	42	> 12	0.07	2.45	0.38	0.01	0.01	UL94-V0
AD450A	Glass, PTFE & Ceramic, 0.0125" Thick	4.50	0.003	-200	10	10	40	12	0.06	2.50	0.40	NT	NT	UL94-V0
AD460A	Glass, PTFE and Ceramic, 0.0125" Thick	4.60	0.003	-200	10	10	40	12	0.06	2.50	0.40	NT	NT	UL94-V0
AD480A	Glass, PTFE and Micro-Dispersed Ceramic	4.80	0.003	-200	10	10	40	12	0.06	2.40	0.40	NT	NT	UL94-V0
AD600	Glass, PTFE and Micro-Dispersed Ceramic	6.15 *	0.003	-241	11	10	45	12	0.04	2.45	0.46	0.02	0.01	UL94-V0
AD1000	Glass, PTFE and Micro-Dispersed Ceramic	10.20 *	0.0023	-380	8	10	20	> 12	0.03	3.2	0.81	0.01	0.00	UL94-V0

* Refer to Tables for Dielectric Constant and Thickness Options



LEGACY AND ORIGINAL MICROWAVE MATERIALS

PRODUCT OVERVIEW

Product	Composition	Dielectric Constant @ 10 GHz	Dissipation Factor @ 10 GHz	Thermal Coefficient of Expansion of Er ppm/°C	Coefficient of Thermal Expansion (ppm/°C)			Typical Peel Strength (lbs)	Water Absorption (%)	Specific Gravity (unitless) or Density (g/cm ³)	Thermal Conductivity (W/mK)	NASA Outgassing		Flammability UL Rating
					X	Y	Z					Total Mass Loss (%)	Collected Volatile (%)	
Traditional - Highest Performance, PTFE Coated Light Woven Glass Styles, Interdispersed PTFE films														
DiClad 522	Woven Fiberglass reinforced PTFE	2.40 - 2.60 *	0.0018	-153	14	21	173	14	0.03	2.31	0.254	0.02	0.00	UL94-V0
DiClad 527	Woven Fiberglass reinforced PTFE	2.40 - 2.60 *	0.0018	-153	14	21	173	14	0.03	2.31	0.254	0.02	0.00	UL94-V0
DiClad 870	Woven Fiberglass reinforced PTFE	2.33	0.0013	-161	17	29	217	14	0.02	2.26	0.257	0.02	0.00	UL94-V0
DiClad 880	Woven Fiberglass reinforced PTFE	2.17, 2.20	0.0009	-160	25	34	252	14	0.02	2.23	0.261	0.01	0.01	UL94-V0
CuClad 250GT	Cross Plied Woven Fiberglass reinforced PTFE	2.50	0.001	-170	18	19	177	14	0.03	2.31	0.254	0.01	0.00	UL94-V0
CuClad 250GX	Cross Plied Woven Fiberglass reinforced PTFE	2.40 - 2.60 *	0.0022	-170	18	19	177	14	0.03	2.31	0.254	0.01	0.00	UL94-V0
CuClad 233LX	Cross Plied Woven Fiberglass reinforced PTFE	2.33	0.0013	-171	23	24	194	14	0.02	2.26	0.258	0.01	0.01	UL94-V0
CuClad 217LX	Cross Plied Woven Fiberglass reinforced PTFE	2.17, 2.20	0.0009	-151	29	28	246	14	0.02	2.23	0.261	0.01	0.01	UL94-V0
IsoClad 933	Non-Woven Fiberglass reinforced PTFE	2.33	0.0016	-132	31	35	203	10	0.05	2.27	0.263	0.03	0.00	UL94-V0
IsoClad 917	Non-Woven Fiberglass reinforced PTFE	2.17	0.0013	-157	46	47	236	10	0.04	2.23	0.263	0.02	0.00	UL94-V0
Original AD Series - Woven Glass and PTFE or Woven Glass, PTFE and Micro-Dispersed Ceramic														
AD250	Woven Glass and PTFE	2.50	0.0018	-110	12	15	95	14	0.07	2.40	0.235	NT	NT	UL94-V0
AD255	Woven Glass and PTFE	2.55	0.0018	-110	12	15	95	14	0.07	2.40	0.235	NT	NT	UL94-V0
AD270	Woven Glass and PTFE	2.70	0.003	-110	12	15	95	14	0.07	2.40	0.235	NT	NT	UL94-V0
AD350	Glass, PTFE and Micro-Dispersed Ceramic	3.50	0.003	-110	12	15	95	17	0.06	2.40	0.235	NT	NT	UL94-V0
AR Series - Legacy Product, Reference AD1000 as a Next Generation Product														
AR1000	Glass, PTFE and Micro-Dispersed Ceramic	10.00 *	0.003	-233	14	16	37	5	0.08	2.84	0.645	0.02	0.00	UL94-V0
Ultra Thin Laminates with High Dielectric Constant for Couplers and other Miniaturized Components														
AD5	Glass, PTFE and Micro-Dispersed Ceramic	5.10 *	0.003	-300	15	15	45	5	0.05	2.45	0.46	NT	NT	UL94-V0
AD10	Glass, PTFE and Micro-Dispersed Ceramic	10.20 *	0.005	-423	6	6	8	4	0.03	2.80	0.55	NT	NT	UL94-V0
Low Loss Thermoset Resin Systems - Multilayer Capable, non-PTFE														
25N	Ceramic Hydrocarbon	3.38	0.0025	-87	15	15	52	5	0.09	1.70	0.45	0.17	0.24	N/A
25FR	Ceramic Hydrocarbon	3.58	0.0035	50	16	18	59	5	0.09	1.80	0.45	0.01	0.00	UL94-V0

* Refer to Tables for Dielectric Constant and Thickness Options

CLTE-XT

CLTE-XT is the next generation of CLTE with “Best-In-Class” Loss Tangent and Lowest Insertion loss in its class. Excellent dimensional stability, Phase Stability and CTE performance.

	Standard Thickness		Nominal Dielectric Constant
	Inches	Millimeters	
CLTE-XT Master Sheet Size** : 36"x48"	0.0052"	0.132	2.79
	0.0094"	0.239	2.89
	0.020"	0.508	2.92
	0.025"	0.635	2.94
	0.030"	0.762	2.94
	0.040"	1.016	2.94
	0.045"	1.143	2.94
	0.059"	1.499	2.95
	0.060"	1.524	2.94

CLTE-AT

CLTE-AT is a commercially priced product. It uses common technologies developed for CLTE-XT, but, with some non-trivial changes to make the product more affordable, but with less stringent tolerances and performance. To maintain its lower cost base, CLTE-AT has less options for copper style and panel sizes.

	Standard Thickness		Nominal Dielectric Constant
	Inches	Millimeters	
CLTE-AT Master Sheet Size** : 36"x48"	0.005"	0.127	3.00
	0.010"	0.254	3.00
	0.015"	0.381	3.00
	0.020"	0.508	3.00
	0.025"	0.635	3.00
	0.030"	0.762	3.00
	0.040"	1.016	3.00
	0.050"	1.270	3.00
	0.060"	1.524	3.00

CLTE

Glass / PTFE / micro-dispersed ceramic laminates. Offers superior thermomechanical (CTE) stability and Dk over temperature with best-in-class processibility for a PTFE-based laminate.

	Standard Thickness		Nominal Dielectric Constant
	Inches	Millimeters	
CLTE Master Sheet Size** : 36"x48"	0.003"	0.076	2.75
	0.0053"	0.135	2.85
	0.010"	0.254	2.94
	0.015"	0.381	2.95
	0.020"	0.508	2.96
	0.024"	0.610	2.97
	0.031"	0.787	2.98
	0.040"	1.016	2.98
	0.047"	1.194	2.98
	0.062"	1.575	2.98
	0.093"	2.362	2.98

**Master Sheet Sizes are not available on all products or thicknesses. Please contact Arlon Customer Service with questions about material availability.

TC350

TC350 Offers “Best-In-Class” Thermal Conductivity and Dielectric Constant Stability with Temperature leading to excellent impedance control. Excellent thermomechanical (CTE) stability for highly reliability plated thru holes and component attachment.

	Standard Thickness		Nominal Dielectric Constant
	Inches	Millimeters	
TC350 Master Sheet Size** : 36"x48"	0.010"	0.254	3.50
	0.015"	0.381	3.50
	0.020"	0.508	3.50
	0.025"	0.610	3.50
	0.030"	0.787	3.50
	0.040"	1.016	3.50
	0.050"	1.194	3.50
	0.060"	1.575	3.50

TC600

TC600 Offers “Best-In-Class” Thermal Conductivity and Dielectric Constant Stability with Temperature leading to excellent impedance control. Excellent thermomechanical (CTE) stability for highly reliability plated thru holes and component attachment.

	Standard Thickness		Nominal Dielectric Constant
	Inches	Millimeters	
TC600 Master Sheet Size** : 36"x48"	0.010"	0.254	6.15
	0.015"	0.381	6.15
	0.020"	0.508	6.15
	0.025"	0.610	6.15
	0.030"	0.787	6.15
	0.040"	1.016	6.15
	0.050"	1.194	6.15
	0.060"	1.575	6.15

***Master Sheet Sizes are not available on all products or thicknesses. Please contact Arlon Customer Service with questions about material availability.*



MICROWAVE MATERIALS

AD “A” Series

Advancements and improvements to the original AD Series, low cost commercial laminates. Lower loss tangent, tighter dielectric and thickness tolerances, and PIM+ design offerings.

Product	Standard Thickness		Available Nominal Dielectric Constant Options
	Inches	Millimeters	
AD250A	0.080"	2.032	2.50
	0.250"	6.350	2.50
AD255A	0.030"	0.762	2.55
	0.031"	0.787	2.55
	0.040"	1.016	2.55
	0.060"	1.524	2.55
	0.062"	1.575	2.55
	0.080"	2.032	2.55
	AD260A	0.030"	0.762
0.040"		1.016	2.60
0.060"		1.524	2.60
0.090"		2.286	2.60
0.125"		3.175	2.60
AD300A	0.020"	0.508	3.00
	0.030"	0.762	3.00
	0.040"	1.016	3.00
	0.060"	1.524	3.00
	0.090"	2.286	3.00
	0.120"	3.048	3.00
	0.125"	3.175	3.00
AD320A	0.030"	0.762	3.20
	0.040"	1.016	3.20
	0.045"	1.143	3.20
	0.062"	1.575	3.20
	0.125"	3.175	3.20
AD350A	0.020"	0.508	3.50
	0.030"	0.762	3.50
	0.040"	1.016	3.50
	0.060"	1.524	3.50
	0.090"	2.286	3.50
	0.120"	3.048	3.50
	0.125"	3.175	3.50
	0.200"	5.080	3.50

*** Master Sheet Size of 36" x 48" is standard. Please contact Arlon Customer Service with questions about material availability.*



High Dielectric Constant

For Circuit Miniaturization & High Gain Patch Antenna Applications. Excellent for applications requiring low loss, a higher dielectric constant, as well as mechanical robustness capable of handling stress, vibration or drop tests. Much more durable than either Alumina or Ceramic loaded Hydrocarbons.

Product	Standard Thickness		Available Nominal Dielectric Constant Options
	Inches	Millimeters	
AD410	0.030"	0.762	4.10
	0.062"	1.575	4.10
	0.125"	3.175	4.10
	0.250"	6.350	4.10
AD430	0.030"	0.762	4.30
	0.125"	3.175	4.30
AD440A	0.120"	3.048	4.40
AD450	0.010"	0.254	4.50
	0.020"	0.508	4.50
	0.030"	0.762	4.50
	0.040"	1.016	4.50
	0.060"	1.524	4.50
AD450A	0.120"	3.048	4.50
AD460A	0.120"	3.048	4.60
AD480A	0.120"	3.048	4.80
LC600A	0.250"	6.350	6.15
AD1000	0.006"	0.152	7.80
	0.0105"	0.267	9.10
	0.015"	0.381	9.70
	0.020"	0.508	10.0
	0.025"	0.635	10.2
	0.030"	0.762	10.35
	0.050"	1.270	10.6
	0.059"	1.499	10.7
	0.127"	3.226	10.9
AD1000X	0.050"	1.270	10.2
	0.098"	2.489	10.2
	0.125"	3.175	10.2

***Master Sheet Size of 36" x 48" is standard. Please contact Arlon Customer Service with questions about material availability.*



AD Series

The original AD Series is designed for commercial applications relying on a thicker laminate that are driven by low cost. PIM design offerings. Typical applications include base station antennas and BSA feed networks. Through the use of thicker building blocks and thicker glass styles, lower costs are achieved through less labor and machine time.

Product	Standard Thickness		Available Nominal Dielectric Constant Options
	Inches	Millimeters	
AD250	0.020"	0.508	2.50
	0.031"	0.787	2.50
	0.062"	1.575	2.50
AD255 <i>(AD255A provides 17% lower loss tangent and tighter tolerances)</i>	0.030"	0.762	2.55
	0.031"	0.787	2.55
	0.040"	1.016	2.55
	0.060"	1.524	2.55
	0.062"	1.575	2.55
	0.080"	2.032	2.55
AD270	0.015"	0.381	2.70
	0.020"	0.508	2.70
	0.031"	0.787	2.70
	0.062"	1.575	2.70
	0.093"	2.362	2.70
AD295	0.040"	1.016	2.95
AD320 <i>(AD320A offers lower loss tangent and tighter tolerances)</i>	0.020"	0.508	3.20
	0.031"	0.787	3.20
	0.062"	1.575	3.20

***Master Sheet Size of 36" x 48" is standard. Please contact Arlon Customer Service with questions about material availability.*



DiClad® Series

Unidirectional woven fiberglass / PTFE laminates available in a range of Dk's (2.17 to 2.60) and low dielectric loss values (0.0009 to 0.0022). These products use finer glass styles for precision and have a very high degree of low loss PTFE.

Product	Standard Thickness		Available Nominal Dielectric Constant Options
	Inches	Millimeters	
DiClad 522 (Thicknesses represent overall laminate thickness, including copper foil) Master Sheet Size** : 36"x72", 36"x48", 36"x36"	0.015"	0.381	2.50, 2.55
	0.020"	0.508	2.50
	0.024"	0.610	2.50, 2.60
	0.031"	0.787	2.45, 2.50, 2.55, 2.60
	0.047"	1.194	2.50, 2.55, 2.60
	0.062"	1.575	2.45, 2.50, 2.55, 2.60
	0.093"	2.363	2.55
	0.125"	3.175	2.50, 2.55, 2.60
	0.187"	4.750	2.50
	0.250"	6.350	2.50, 2.55, 2.60
DiClad 527 Master Sheet Size** : 36"x72", 36"x48", 36"x36"	0.005"	0.127	2.50, 2.55
	0.010"	0.254	2.45, 2.50, 2.55, 2.60
	0.015"	0.381	2.45, 2.50, 2.55
	0.020"	0.508	2.40, 2.45, 2.50, 2.55
	0.031"	0.787	2.40, 2.45, 2.50, 2.55, 2.60
	0.040"	1.016	2.40, 2.45, 2.50, 2.55, 2.60
	0.047"	1.194	2.50
	0.060"	1.524	2.50, 2.55
	0.062"	1.575	2.40, 2.45, 2.50, 2.55, 2.60
	0.093"	2.363	2.45, 2.55
	0.125"	3.175	2.45, 2.50, 2.55
DiClad 870 Master Sheet Size** : 36"x72", 36"x48", 36"x36"	0.005"	0.127	2.33
	0.010"	0.254	2.33
	0.015"	0.381	2.33
	0.020"	0.508	2.33
	0.030"	0.762	2.33
	0.040"	1.016	2.33
	0.060"	1.524	2.33
	0.125"	3.175	2.33
DiClad 880 Master Sheet Size** : 36"x72", 36"x48", 36"x36"	0.005"	0.127	2.17, 2.20
	0.010"	0.254	2.17, 2.20
	0.015"	0.381	2.17, 2.20
	0.020"	0.508	2.17, 2.20
	0.030"	0.762	2.17, 2.20
	0.050"	1.270	2.17, 2.20
	0.060"	1.524	2.17, 2.20
	0.125"	3.175	2.17, 2.20

**Master Sheet Sizes are not available on all products or thicknesses. Please contact Arlon Customer Service with questions about material availability.



MICROWAVE MATERIALS

CuClad® Series

Cross-plyed woven fiberglass / PTFE laminates available in a range of Dk's (2.17 to 2.60) and loss (0.0009 to 0.0022). The sequential layers of fabric are cross-plyed to insure in-plane isotropy for applications requiring matched electrical properties in the X-Y plane.

	Standard Thickness		Nominal Dielectric Constant
	Inches	Millimeters	
CuClad 250GX Master Sheet Size** : 36"x48" (non-cross-plyed), 36"x36" (cross-plyed)	0.004"	0.102	2.4
	0.010"	0.254	2.48, 2.55
	0.015"	0.381	2.44, 2.48, 2.55
	0.020"	0.508	2.45, 2.48, 2.50, 2.55
	0.030"	0.762	2.40, 2.45, 2.50, 2.55
	0.031"	0.787	2.45, 2.50, 2.55
	0.047"	1.194	2.50
	0.060"	1.524	2.40, 2.45, 2.50, 2.55
	0.062"	1.575	2.45, 2.50, 2.55
	0.093"	2.362	2.48
	0.120"	3.048	2.45, 2.50, 2.55
	0.125"	3.175	2.45, 2.50, 2.55
CuClad 250GT (Thicknesses represent overall laminate thickness, including copper foil) Master Sheet Size** : 36"x48" (non-cross-plyed), 36"x36" (cross-plyed)	0.010"	0.254	2.50
	0.015"	0.381	2.50
	0.020"	0.508	2.50
	0.031"	0.787	2.50
	0.047"	1.194	2.50
	0.062"	1.575	2.50
	0.094"	2.388	2.50
	0.125"	3.175	2.50
	0.187"	4.750	2.50
0.250"	6.350	2.50	
CuClad 233GY & 233LX Master Sheet Size** : GY - 36"x48"(non-cross plyed), 36"x36" (cross-plyed) LX - 34"x48"(non-cross plyed), 34"x36" (cross-plyed) (LX represents a premium grade with additional testing)	0.005"	0.127	2.33
	0.010"	0.254	2.33
	0.015"	0.381	2.33
	0.020"	0.508	2.33
	0.031"	0.787	2.33
	0.045"	1.143	2.33
	0.062"	1.575	2.33
	0.125"	3.175	2.33
CuClad 217GY & 217LX Master Sheet Size** : GY - 36"x48"(non-cross plyed), 36"x36" (cross-plyed) LX - 34"x48"(non-cross plyed), 34"x36" (cross-plyed) (LX represents a premium grade with additional testing and certificate of analysis)	0.005"	0.127	2.17
	0.010"	0.254	2.17
	0.015"	0.381	2.17
	0.020"	0.508	2.17
	0.025"	0.635	2.17
	0.031"	0.787	2.17
	0.040"	1.016	2.17, 2.20
	0.045"	1.143	2.17
	0.060"	1.524	2.17
	0.062"	1.575	2.17
0.125"	3.175	2.17	

**Master Sheet Sizes are not available on all products or thicknesses. Please contact Arlon Customer Service with questions about material availability.



CuClad® Series

Cross-plyed woven fiberglass / PTFE laminates available in a range of Dk's (2.17 to 2.60) and loss (0.0009 to 0.0022). The sequential layers of fabric are cross-plyed to insure in-plane isotropy for applications requiring matched electrical properties in the X-Y plane.

Product	Standard Thickness		Available Nominal Dielectric Constant Options
	Inches	Millimeters	
CuClad 250LX Master Sheet Size** : 34"x48" (non-cross-plyed), 34"x36" (cross-plyed) (LX represents a premium grade with additional testing and certificate of analysis)	0.0053"	0.135	2.53
	0.0101"	0.257	2.48, 2.55
	0.0147"	0.373	2.44, 2.55
	0.0193"	0.490	2.43
	0.030"	0.762	2.45, 2.50, 2.55
	0.031"	0.787	2.45
	0.060"	1.524	2.41, 2.42, 2.43, 2.45, 2.50, 2.55
	0.0625"	1.588	2.50, 2.55
	0.090"	2.286	2.50
	0.125"	3.175	2.45, 2.50, 2.55

IsoClad® Series

Non-woven fiberglass / PTFE laminates available in a of Dk's of either 2.17 or 2.33 with a loss tangent of 0.0013 or 0.0016 respectively. These materials offer lower modulus permitting a more flexible thin laminate than is typical with a woven glass reinforced product.

Product	Standard Thickness		Available Nominal Dielectric Constant Options
	Inches	Millimeters	
IsoClad 933 Master Sheet Size** : 36"x48" & 36"x72"	0.005"	0.127	2.33
	0.010"	0.254	2.33
	0.015"	0.381	2.33
	0.020"	0.508	2.33
	0.031"	0.787	2.33
	0.045"	1.143	2.33
	0.060"	1.524	2.33
IsoClad 917 Master Sheet Size : 36"x48" & 36"x72"	0.005"	0.127	2.17
	0.010"	0.254	2.17
	0.015"	0.381	2.17
	0.020"	0.508	2.17
	0.031"	0.787	2.17
	0.045"	1.143	2.17
	0.062"	1.575	2.17

**Master Sheet Sizes are not available on all products or thicknesses. Please contact Arlon Customer Service with questions about material availability.

AD5 & AD10

Ultra-thin, high dielectric, glass / PTFE / micro-dispersed ceramic laminates, ideal for miniaturization of microwave components such as couplers.

	Standard Thickness		Nominal Dielectric Constant
	Inches	Millimeters	
AD5 (18"x24" panels only)	0.003"	0.076	5.1
AD10 (18"x24" panels only)	0.0024"	0.061	10.2

AR Series (Legacy Material)

Glass / PTFE laminates with or without micro-dispersed ceramic fillers. These Legacy products continue to be manufactured to support legacy customer designs. Arlon encourages new designs and inquiries towards AD320A (for AR320) and AD1000 (for AR1000). The newer designs offer both lower price as well as higher performance to provide more Customer Value.

Product	Standard Thickness		Nominal Dielectric Constant	
	Inches	Millimeters	AR320	AR1000
AR SERIES Master Sheet Size** : 36"x48" for AR1000 36"x72" & 36"x48" for AR320	0.015"	0.381	--	9.6
	0.020"	0.508	--	9.6
	0.024"	0.610	3.20	9.7
	0.031"	0.787	3.20	9.7
	0.047"	1.194	3.20	9.7
	0.050"	1.270	--	9.8
	0.062"	1.575	3.20	9.8
	0.093"	2.362	3.20	9.8
	0.100"	2.540	--	9.8
	0.125"	3.175	3.20	--

25 Series, Non-PTFE, Low Loss Thermoset Resin Systems

The 25 Series Products are Ceramic Hydrocarbon, Low Loss Thermoset material family with matching Pre-pregs. Excellent for multi-layer applications. 25FR contains a Flame Retardant and UL94 V0.

Standard Laminate Thickness (inches)		
25N	25FR	Tolerance
0.006	0.006	±0.0007
0.008	0.008	±0.0010
0.010	0.010	±0.0010
0.012	0.012	±0.0015
0.018	0.018	±0.0020
0.020	0.020	±0.0020
0.024	0.024	±0.0020
0.030	0.030	±0.0030
0.060	0.058	±0.0040

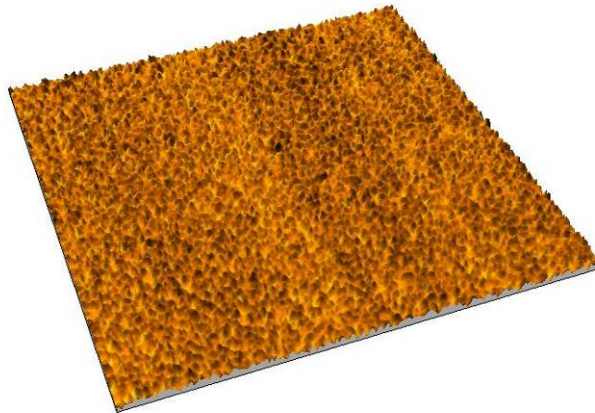
Prepreg Thickness (inches)		
Glass Style	25N	25FR
1080	0.0039	0.0039
2112	0.0058	0.0058
2113	0.0067	0.0067

Copper Cladding

Arlon offers a variety of copper foil cladding for high performance laminates to insure the optimal balance of low insertion loss, excellent mechanical properties and cost. Below is a list of typical copper foil options.

Copper Foil	Typical Surface Roughness (R_{rms})		Thickness mil (mm)
	Treated Side μin (μm)	Untreated Side μin (μm)	
1/2 oz Electrodeposited (ED) Copper	31 (0.78)	10-15 (0.3-0.4)	0.7 (0.018)
1 oz Electrodeposited (ED) Copper	46 (1.2)	10-15 (0.3-0.4)	1.4 (0.036)
2 oz Electrodeposited (ED) Copper	82 (2.1)	10-15 (0.3-0.4)	2.8 (0.072)
1/2 oz Reverse Treat Electrodeposited (RT)	13 (0.3)	20-40 (0.5-1.1)	0.7 (0.018)
1 oz Reverse Treat Electrodeposited (RT)	17 (0.43)	20-40 (0.5-1.1)	1.4 (0.036)
1/2 oz Rolled Copper (RA)	30 (0.78)	5-12 (0.13-0.3)	0.7 (0.018)
1 oz Rolled Copper (RA)	30 (0.78)	5-12 (0.13-0.3)	1.4 (0.036)

PIM Grade Copper available on certain products. Additional copper foils, heavy metal plate or specialty foils such as Ohmega Technologies Ohmega-Ply® or TICER TCR® Resist foils are available upon request. Not all copper foil options are available on all products or thicknesses. Please contact Arlon Customer Service with questions about material availability.



Surface Roughness Profile of Arlon 0.5 Ounce, Electrodeposited (ED) Copper via Non-Contact Optical Aberration Technique





MATERIALS FOR ELECTRONICS

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