

Dielectric Constant Dk @ 10 GHz Relative Permittivity	Supplier	Grade/Name	Disipation factor Df@ 10 GHz Loss Tangent	Construction Reinforcement / filler	CTE ppm/ C X Y Z per IPC-650	MIL-S-13949 designation	IPC-L-125A specification sheet	Sheet Standard	Size Master
2.1	Polyflon	CuFlon	0.0005	PTFE					
2.15	Taconic	605	0.001	Woven Glass PTFE		GY	125/05		
2.17-2.20+/-0.02	Arlon	CuClad 217 LX	0.0009	Woven crossply PTFE	29 28 248	GY	125/05	17 X 36	36 X 36
2.17-2.20+/-0.02	Arlon	DiClad 880	0.0009	Woven Glass PTFE	25 34 252	GY	125/05	12 X 18	136x48.72
2.17+/-0.02	Arlon	Intermod-165d/bc	0.0008	Woven Glass PTFE	28 34 262	165 d/bc in antenna	125/05	12 X 18	136x48.72
2.17-2.20+/-0.02	Arlon	Isoclad 917	0.0009	Random glass PTFE	48 47 311	GP,GR	125/04	12 X 18	36x48.72
2.17+/- 0.02	Metclad	MY-0217(MY1)	0.0008-0.0011	Woven Glass PTFE	25 35 260	GY	125/05	12 X 18	36 X 48
2.17+/- 0.02	Rogers	RT/duroid 5881	0.0009-0.0015	Random glass PTFE	31 48 237	GP,GR	125/04	12 X 18	18 X 48
2.17-2.33+/-0.02	Metclad	MY0217M intermod	0.0008-0.0011	Woven Glass PTFE	25 35 260	rated @-155d/bc GY	125/05	12X18	36 X 48
2.17+/-0.04	Rogers	Ultralam 17	0.0015	Random glass PTFE	31 48 237	GP,GR	125/04	12 X 18	18 X 48
2.17+/- 0.02	Rogers	Ultralam 1217	0.0009	Woven Glass PTFE	20 20 280	GY	125/05		48 X 120
2.17+/- 0.02	Taconic	TLY-5A	0.0009	Woven Glass PTFE	20 35 290	GY	125/05	36 X 48	36 X 116
2.20+/-0.02	Metclad	MY-0220(MY2)	0.0009-0.0012	Woven Glass PTFE	25 35 260	GY	125/05	12 X 18	36 X 48
2.20+/-0.02	Rogers	RT/duroid 5880	0.0009-0.0015	Random glass PTFE	31 48 237	GP,GR	125/04	12 X 18	18 X 48
2.20+/-0.04	Rogers	Ultralam 22	0.0015	Random glass PTFE	31 48 237	GP	125/04	12 X 18	18 X 48
2.20+/-0.02	Taconic	TLY-5	0.0009	Woven Glass PTFE	20 35 290	GY	125/05	36 X 48	36 X 116
2.2	Taconic	605	0.001	Woven Glass PTFE	20 35 290	GY	125/05		
2.32+/-0.005	Polyflon	Polyguide	0.0002	Woven Glass PTFE	108 108 108				22 X 32
2.33+/-0.02	Arlon	CuClad 233LX	0.0013	Woven crossply PTFE	23 24 194	GY	125/05	12 X 18	36 X 36
2.33+/-0.02	Arlon	DiClad 870	0.0013	Woven Glass PTFE	17 29 217	GY	125/05	12 X 18	36x48.72
2.33+/-0.02	Arlon	Isoclad 933	0.0015	Random glass PTFE	31 35 203	GP,GR	125/04	12 X 18	36x48.72
2.33+/-0.02	Metclad	MY-0233(MY3)	0.0011-0.0014	Woven Glass PTFE	25 35 260	GY	125/05	12 X 18	36 X 48
2.33+/-0.02	Rogers	RT/duroid 5870	0.0012-0.0015	Random glass PTFE	22 28 173	GP,GR	125/04	12 X 18	18 X 48
2.33+/-0.04	Rogers	Ultralam 33	0.0015	Random glass PTFE	31 48 237	GP	125/04	12 X 18	18 X 48
2.33+/-0.02	Taconic	TLY-3	0.0013	Woven Glass PTFE	20 35 290	GY	125/05	36 X 48	36 X 116
2.35	Taconic	605	0.001	Woven Glass PTFE	20 35 290	GY	125/05		
2.4-2.6+/- 0.05	Arlon	CuClad 250GT	.0008-.0012@ 1 MHz	Woven crossply PTFE	18 19 177	GT	125/01	17 X 36	36 X 36
2.4-2.6+/-0.04	Arlon	CuClad 250GX	.0016-.0022@1 MHz	Woven crossply PTFE	18 19 177	GX	125/02	17 X 36	36 X 36
2.4-2.6+/- 0.05	Arlon	DiClad 522	.0008-.0012@ 1 MHz	Woven Glass PTFE	14 21 173	GT	125/01	12 X 18	36x48.72
2.4-2.6+/-0.04	Arlon	DiClad 527	0.0022	Woven Glass PTFE	18 19 182	GX	125/02	12 X 18	36x48.72
2.4-2.6+/-0.04	Rogers	Ultralam 2000	0.0019-0.0022	Woven Glass PTFE	10 10 120	GX	125/01	12 X 18	18 X 48
2.4,2.5,2.6	Taconic	601,602	0.002	Woven Glass PTFE		GT,GX	125/02	12 X 18	
2.43+/-0.04	Metclad	MX-0243(MX6)	0.0016-0.0019	Woven Glass PTFE	12 18 150	GX	125/02	12 X 18	36 X 48
2.45+/-0.04	Metclad	MX-0245(MX1)	0.0017	Woven Glass PTFE	12 18 150	GX	125/02	12 X 18	36 X 48
2.45+/-0.05	Taconic	TLT-0	0.0017	Woven Glass PTFE	9-12 140	GT	125/01	36 X 48	36 X 116
2.45+/-0.04	Taconic	TLX-0	0.0017	Woven Glass PTFE	9-12 140	GX	125/02	36 X 48	36 X 116
2.48+/-0.04	Metclad	MX-0248(MX5)	0.003	Woven Glass PTFE	12 18 150	GX	125/02	12 X 18	36 X 48
2.50+/-0.05	Arlon	AD 290	0.0017	Woven Glass PTFE	12 15 95	155d/bc		12 X 18	36x48.72
2.50+/-0.04	Metclad	MX-0250(MX2)	0.0017	Woven Glass PTFE	12 18 150	GX	125/02	12 X 18	36 X 48
2.50+/-0.04	Rogers	Ultralam 1250	0.0015	Woven Glass PTFE	12 12 140	GX	125/02	12 X 18	48 X 120
2.50+/-0.05	Taconic	TLT-9	0.0019	Woven Glass PTFE	9-12 140	GT	125/01	36 X 48	36 X 116
2.50+/-0.04	Taconic	TLX-9	0.0019	Woven Glass PTFE	9-12 140	GX	125/02	36 X 48	36 X 116
2.55	Polyflon	NorCLAD	0.003	Woven Glass PTFE	53 53 53	n/a		20 X 22	
2.55+/-0.04	Metclad	MX-0255(MX3)	0.0018-0.0021	Woven Glass PTFE	12 18 150	GX	125/02	12 X 18	36 X 48
2.55+/-0.05	Taconic	TLT-8	0.0021	Woven Glass PTFE	9-12 140	GT	125/01	36 X 48	36 X 116
2.55+/-0.04	Taconic	TLX-8	0.0021	Woven Glass PTFE	9-12 140	GX	125/02	36 X 48	36 X 116
2.55+/-0.04	Metclad	MX-0260(mx4)	0.0019	Woven Glass PTFE	12 18 150	GX	125/02	12 X 18	36 X 48
2.6	Shieldahl	ComClad	0.0025	Thermoset Resin	59 59 59	Copper Clad Norel		12 X 18	
2.6+/-0.05	Taconic	TLT-7	0.0023	Woven Glass PTFE	9-12 140	GT	125/01	36 X 48	36 X 116
2.6+/-0.04	Taconic	TLX-7	0.0023	Woven Glass PTFE	9-12 140	GX	125/02	36 X 48	36 X 116
2.65+/-0.05	Taconic	TLT-6	0.0025	Woven Glass PTFE	9-12 140	GT	125/01	36 X 48	36 X 116
2.65+/-0.04	Taconic	TLX-6	0.0025	Woven Glass PTFE	9-12 140	GX	125/02	36 X 48	36 X 116
2.7+/-0.05	Arlon	AD 270	0.003@1 MHz	Woven Glass PTFE	12 15 95			12 X 18	36x48.72
2.7+/-0.04	Metclad	MX-0270(MX10)	0.002	Woven Glass PTFE	12 18 150	GX	125/02	12 X 18	36 X 48
2.75+/-0.05	Taconic	TLC-27	0.003	Woven Ceramic filled PTFE	9-12 70			36 X 48	36 X 116
2.8+/-0.04	Metclad	MX-0280(MX14)	0.0021	Woven Glass PTFE	9 12 71	GX	125/02	12 X 18	36 X 48
2.92+/-0.04	Rogers	RT/duroid 6002	0.0012-0.0017	Ceramic filled PTFE	16 16 24			12 X 18	18 X 48
2.94+/-0.04	Metclad	MX-0294(MX8)	0.0022-0.0025	Woven Glass PTFE	9 12 71	GX	125/02	12 X 18	36 X 48
2.94+/-0.04	Metclad	MH-0294	0.0022-0.0025	Woven Ceramic filled PTFE	9 12 71	GX		12 X 18	36 X 48
2.94+/-0.04	Rogers	RT/duroid 6002	0.0012-0.0017	Ceramic filled PTFE	16 16 24			12 X 18	
2.94 nominal	Arlon	CLTE	0.0025	Woven Ceramic filled PTFE	10 12 40		125/06	12 X 18	36x48.72
2.95+/-0.05	Arlon	AD 295	0.003	Woven Glass PTFE	12 15 95			12 X 18	36x48.72
2.955+/-0.05	Taconic	TLE-95	0.0028	Woven Ceramic filled PTFE	9-12 70			36 X 48	36 X 116
3.00+/-0.05	Arlon	AD 300	0.003	Woven Glass PTFE	12 15 95	151+3405d/bc		12 X 18	36x48.72
3.00+/-0.04	Metclad	MX-0300(MX7)	0.0023-0.0026	Woven Glass PTFE	9 12 71	GX	125/02	12 X 18	36 X 48
3.00+/-0.04	Metclad	MH-0300	0.0023-0.0026	Woven Ceramic filled PTFE	9 12 71	GX		12 X 18	36 X 48
3.00+/-0.04	Rogers	RO3003	0.0013	Ceramic filled PTFE	17 17 24			12 X 18	18 X 48
3.00+/-0.04	Rogers	Ultralam 1300	0.003	Woven Glass PTFE	9 9 70	GX	125/02	48 X 120	
3.00+/-0.05	Taconic	TLE-95	0.0028	Woven Ceramic filled PTFE	9-12 70			36 X 48	36 X 116
3.00+/-0.05	Taconic	TLC-30	0.003	Woven Ceramic filled PTFE	9-12 70			36 X 48	36 X 116
3.02+/-0.04	Rogers	RO3203	0.0016	Woven/nonwoven ceramic PTFE	13 13 58			12 X 18	18x24
3.05+/-0.05	GIL	GML 1000	0.004	Polyester	40 34 80				36 X 120
3.05	Polyflon	Cu Clad ULTEM	0.003		56 46 56			20 X 22	
3.18+/-0.04	Metclad	MX-0318(MX18)	0.0024-0.0027	Woven Glass PTFE	9 12 71	GX	125/02	12 X 18	36 X 48
3.18+/-0.04	Metclad	MX-0318	0.0024-0.0027	Woven Ceramic filled PTFE	9 12 71	GX		12 X 18	36 X 48
3.2+/-0.10	Arlon	AD 320	0.003	Woven Glass PTFE	12 15 95			12 X 18	36x48.72
3.2+/-0.10	Arlon	AR 320	0.003	Woven Glass PTFE	9 12 71			12 X 18	36x48.72
3.2+/-0.04	Metclad	MX-0320(MX9)	0.0024-0.0027	Woven Glass PTFE	9 12 71	GX	125/02	12 X 18	36 X 48
3.2+/-0.04	Metclad	MH-0320	0.0024-0.0027	Woven Ceramic filled PTFE	9 12 71	GX		12 X 18	36 X 48
3.20+/-0.05	Taconic	TLC-32	0.003	Woven Ceramic filled PTFE	9-12 70			36 X 48	36 X 48
3.26+/-0.05	GIL	MC5	0.014	Polyester	25 26 315				36 X 120
3.26+/-0.04	Metclad	MH-0326(MX13)	0.0025-0.003	Woven Ceramic filled PTFE	9 12 71			12 X 18	36 X 48
3.27+/-0.016	Rogers	TMM 3	0.002	Ceramic filled Thermoset Resin	16 16 20			12 X 18	18 X 24
3.25+/-0.07	Arlon	25N	0.0035	Woven Ceramic filled Thermoset	17 17 70			18 X 24	36x48.72
3.3	Arlon	LNB	0.0035	Woven Ceramic filled Thermoset					
3.3	Nelco	N6000		Woven Thermoset Resin					
3.48+/-0.07	Arlon	25FR	0.0035	Woven Ceramic filled Thermoset	20 20 80			18 X 24	36x48.72
3.38+/-0.04	Metclad	MH-0338(MX11)	0.0025-0.0030	Woven Ceramic filled PTFE	9 12 71			12 X 18	36 X 48
3.38+/-0.05	Rogers	RO4003	0.0022	Woven Ceramic filled Thermoset	17 17 24	.004increments		12 X 18	24 X 72
3.45-3.48	Taconic	RF-35	0.100(Lucent)	Woven Ceramic filled PTFE	19-24 64	Dk=3.5 Df=.0018@ 1.9 GHz	Lucent	12 X 18	36 X 120
3.48+/-0.04	Metclad	MH-0348(MX12)	0.003	Woven Ceramic filled PTFE	9 12 71			12 X 18	36 X 48
3.48+/-0.05	Rogers	RO4350	0.004	Woven Ceramic filled Thermoset	17 17 24	.004 increments		12 X 18	24 X 72
3.5+/-0.30	Arlon	AR 350	0.0026	Random Glass Ceramic filled PTFE	35 35 115			12 X 18	36x48.72
3.5+/-0.12	Arlon	AD 350	.003 max	Woven Glass Ceramic filled PTFE	12 15 95			12x18	36x48.72
3.5-4.0	Isola	Gigaver 210	0.01	Woven glass Thermoset Resin					
3.6+/-0.1	Arlon	AD 360	0.003	Woven Glass PTFE	12 15 36	.062 only		12 X 18	36x48.72
3.6-4.2 typical	Matsushita	Megtron	0.01-0.015	Woven Thermoset		Getek License			
3.8-4.2	G.E.	Getek	0.01	Woven Thermoset	12 15 55	Tested @ 1 MHz		18 X 24	36 X 72
3.8-4.0	Isola	Gigaver 410	0.007	Woven Thermoset					
3.86+/-0.08	GIL	MC3	0.019	Polyester					
4.5+/-0.15	Arlon	AR 450	0.0026@1 MHz	Random Glass Ceramic filled PTFE	30 30 110			12 X 18	36x48.72
4.5+/-0.045	Rogers	TMM 4	0.002	Ceramic filled Thermoset	14 14 20			12 X 18	18 X 24
6.0+/-0.15	Arlon	AR 600	0.0035	Woven Glass Ceramic filled PTFE	12 14 62	FSR		12 X 18	36x48.72
6.0+/-0.08	Rogers	TMM 6	0.0023	Ceramic filled PTFE	16 16 20			12 X 18	18 X 24

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6.15+/-0.15	Rogers	RO3006	0.0025	Ceramic filled PTFE	17 17 24		125/07	12 X 18	18 X 48
6.15+/-0.15	Rogers	RT/duroid 6006	0.0019-0.0027	Ceramic filled PTFE	47 34 117		125/07	10 X 10	22 X 22
9.2+/-0.23	Rogers	TMM 10	0.0017	Ceramic filled Thermoset	16 16 20			12 X 18	18 X 24
9.8+/-0.245	Rogers	TMM 10i	0.0015	Ceramic filled Thermoset	16 16 20			12 X 18	18 X 24
10.0 nominal	Arlon	AR 1000	0.003	Woven Ceramic filled PTFE	14 16 36	'FSR	125/08	12 X 18	36x48,72
10.0 nominal	Taconic	CER-10	0.004	Woven Ceramic filled PTFE	13-15 46			12 X 18	36 X 48
10.2+/-0.30	Rogers	RO3010	0.0035	Ceramic filled PTFE	17 17 24		125/08	12 X 18	18 X 48
10.2+/-0.50	Rogers	RO3210	0.003	Woven Ceramic filled PTFE	13 13 34			12 X 18	24 X 36
10.2/5/.8+/-0.25	Rogers	RT/duroid 6010	0.0023-0.0028	Ceramic filled PTFE	24 24 24		125/08	10 X 10	22 X 22
10.2+/-0.25	Rogers	RT/duroid 6010LM	0.0023-0.0028	Ceramic filled PTFE	24 24 24		125/08	10 X 10	22 X 22
10.5+/-0.4	Rogers	Ultralam 105	0.003 max	Ceramic filled PTFE	24 24 24		125/08	10 X 10	22 X 22

### Bonding Films and Prepregs

Type	Supplier	Thickness (mils)	Continuous Use F C	Melt point or Tg F C	Lamination pressure (psi)	Bonding Temp F C	Dk@ 10 GHz	Df 10 GHz	Z Axis CTE ppm F C
<b>Adhesives/ Films</b>									
<b>Thermoplastic</b>									
PTFE	DuPont			621 327		680-720 360-382	2.08	0.0005	129
PFA,CLP	DuPont	1,2	500 260	572-590 300-310		610-615 321-324	2.15	0.0005	
FEP,C-20	DuPont	.5,1,2,5	400 205	500-536 260-280	50-200	540-565 282-296	2.06	0.001	54 94
6700	Arlon	1.5,3	350 178	361-367 188	100	400-425 219	2.35	0.0025	
FV6700	Metclad	1.5				238	2.35	0.0025	
3001	Rogers	1.5		168-197	50-200	425 220	2.28	0.003	
HT 1.5	Taconic	1.5		397	100-200	425-450 218-232	2.35	0.0025	
6250	Arlon	1.5		213 101	100	250-275 121-135	2.32	0.0013	
Polyflon	Polyflon				100-125	250-300 121-149	2.34	0.002	
LDPE				110 C		120	2.3	0.0005	
<b>Thermoset</b>									
Pyrolux LF	DuPont	.5,1,1.5,2,3,4		100 40	200-400	360-390 200-400	3.6-4.0	0.02-0.03	400
PTFE Coated Glass	DuPont			621 327		680-720 360-382			
FEP Coated Glass	DuPont			509-550 265-288		550-575 288-302			
ULTE-P	ARLON	3.2			200-400	550-575 288-302	2.94		
6002 Bond-Fly	Rogers			621 327	1700	700-730 360-382	2.94	0.0012	24
<b>Thermoset</b>									
Speedboard C	Gore	1.5,2,3,3.5,4,5		220 C	100-350	177-225	2.7	0.004	
Gigaver 210	Isola	3,6,7		210 C	300	200 C			
N6000	Nelco			210 C	285-425	180-280	3.3	0.005	
N6000SI	Nelco			210 C	285-425	180-280	3.3	in testing	
Getek	GE	2,2.2,7,3,6,4,6,6,7		175-185 C	125-325	375-395	3.6-4.2	0.010-0.015	171
Megtron	Matsushita	all data as	above. Getek	licensing agreement.					
Ro4403	Rogers	4		280 C		360-375 182-190	3.2	0.0034	
Speedboard N	Gore	1.5,2,3,3.5,4,5		140 C	100-350	350 177	3	0.02	
Z5N	Arlon	6.5		110 C			3.25	0.0024	60
Z5FR	Arlon	6.5		110 C			3.25	0.0024	60