

## Advanced PCB Materials Product Selection Guide

*This Selection Guide provides a sampling of the thousands of product configurations Taconic offers. If your design requires a specialized laminate or prepreg, please contact Taconic to discuss your application.*

## Taconic High Performance Materials - Typical Values

Part #	Composition	Dk	Dk Tolerance + / -	Df	Flex Strength kpsi		Moisture Absorption %	Thermal Conductivity W/M*K	CTE * ppm/°C			Peel Strength lbs/in Very Low Profile Cu
					MD	CD			x	y	z	
TLY-5A	PTFE - Glass	2.17 <sup>(a)</sup>	0.02	0.0009 <sup>(a)</sup>	14	13	0.02	0.22	20	20	280	12
TLY-5	PTFE - Glass	2.20 <sup>(a)</sup>	0.02	0.0009 <sup>(a)</sup>	14	13	0.02	0.22	20	20	280	12
TLY-3	PTFE - Glass	2.33 <sup>(a)</sup>	0.02	0.0012 <sup>(a)</sup>	14	13	0.02	0.22	20	20	280	12
TLX-0, 9, 8, 7, 6	PTFE - Glass	2.45 - 2.65 <sup>(a)</sup>	0.04	0.0015 - 0.0021 <sup>(a)</sup>	23	17	0.02	0.22	21	23	215	12
TLA-6 (KTC)	PTFE - Glass	2.62	0.05	0.0012	13	12	0.02	0.22	9	12	130-145	10
<i>fastFilm</i> <sup>TM</sup> 27D (FF-27D) <sup>‡</sup> (TP)	PTFE Ceramic - Film	2.65 <sup>(c)</sup>	0.10	0.0010 <sup>(c)</sup>	6	5	0.03	0.34	29	28	112	16
EZ-IO	PTFE Ceramic - Glass	2.80 <sup>(c)</sup>	0.05	0.0012 <sup>(c)</sup>	16	8	0.12	0.42	13	24	63	5 - 7
TSM-DS3M	PTFE Ceramic - Glass	2.94 <sup>(c)</sup>	0.04	0.0011 <sup>(c)</sup>	12	8	0.07	0.65	10	16	23	8
TLE-95	PTFE - Glass	2.95 <sup>(a)</sup>	0.05	0.0026 <sup>(a)</sup>	24	18	0.02	0.28 <sup>(c)</sup>	9	12	70	12
RF-30A	PTFE Ceramic - Glass	2.97 <sup>(b)</sup>	0.05	0.0012 <sup>(b)</sup>	20	16	0.02	0.35	8	12	75	10
TSM-DS3	PTFE Ceramic - Glass	3.00 <sup>(c)</sup>	0.04	0.0011 <sup>(c)</sup>	12	8	0.07	0.65	10	16	23	8
RF-30	PTFE Ceramic - Glass	3.00 <sup>(b)</sup>	0.10	0.0014 <sup>(b)</sup>	20	16	0.02	0.20	11	21	208	10
TLC-30, 32 (TP, KTC) TLC-338, 35 (TP)	PTFE - Glass	3.00 - 3.50 <sup>(a)</sup>	0.05	0.0023 - 0.0037 <sup>(a)</sup>	24	19	0.02	0.24	9	12	70	12
RF-35TC (TP)	PTFE Ceramic - Glass	3.50 <sup>(c)</sup>	0.05	0.0011 <sup>(c)</sup>	13	12	0.05	0.60 <sup>†</sup> / 0.92 <sup>††</sup>	11	13	34	7
RF-35	PTFE Ceramic - Glass	3.50 <sup>(b)</sup>	0.10	0.0018 <sup>(b)</sup>	22	18	0.03	0.32 <sup>(c)</sup>	19	24	64	10
RF-35A2	PTFE Ceramic - Glass	3.50 <sup>(c)</sup>	0.05	0.0018 <sup>(c)</sup>	16	8	0.03	0.29	8	10	104	12
TLF-35A (KTC)	PTFE Ceramic - Glass	3.50 <sup>(b)</sup>	0.05	0.0020 <sup>(b)</sup>	19	15	0.02	0.36	21	23	85	10
RF-41, 43, 45	PTFE Ceramic - Glass	4.10 - 4.50 <sup>(d)</sup>	0.15	0.0033 - 0.0038 <sup>(d)</sup>	21	19	0.02, 0.02, 0.04	0.29, 0.30, 0.33	9	12	96	8
TRF-41, 43, 45 (KTC)	PTFE Ceramic - Glass	4.30	0.15	0.0035	17	15	0.06	0.43	9	9	40	8
RF-60TC	PTFE Ceramic - Glass	6.15 <sup>(c)</sup>	0.15	0.0020 <sup>(c)</sup>	10	9	0.03	0.90 <sup>†</sup> / 1.05 <sup>††</sup>	10	10	40	8
RF-60A	PTFE Ceramic - Glass	6.15 <sup>(d)</sup>	0.25	0.0038 <sup>(c)</sup>	18	15	0.02	0.40	9	8	69	8
CER-10 (0.0620")	PTFE Ceramic - Glass	10.00 <sup>(d)</sup>	0.50	0.0035 <sup>(c)</sup>	17	16	0.04	0.63	13	15	46	9
RF-10	PTFE Ceramic - Glass	10.20 <sup>(c)</sup>	0.30	0.0025	14	10	0.08	0.85	16	20	25	10
Prepreg/Bonding Films												
HT-1.5	Thermoplastic Film	2.35		0.0025			0.01	0.22				
<i>fastRise</i> <sup>TM</sup> 27 (FR-27) <sup>‡</sup>	Prepreg/Thermoset	2.75 <sup>(c)</sup>	0.04	0.0014 <sup>(c)</sup>			0.08	0.25	59	70	72	
<i>fastRise</i> <sup>TM</sup> 7 (FR-7) <sup>‡</sup> (TP)	Prepreg/Thermoset	7.45 <sup>(c)</sup>		0.0034 <sup>(c)</sup>	15	7	0.10	0.43	10	17	62	

(KTC): Product manufactured exclusively at Korea Taconic Company, Republic of Korea

(TP): Product manufactured exclusively at Taconic Headquarters, Petersburg, NY

- (a) Measured by IPC-TM-650 method 2.5.5.5 (stripline resonator) at 10 GHz  
 (b) Measured by IPC-TM-650 method 2.5.5.5.1 (modified stripline) at 1.9 GHz  
 (c) Measured by IPC-TM-650 method 2.5.5.5.1 (modified stripline) at 10 GHz  
 (d) Measured by IPC-TM-650 method 2.5.5.6 (full sheet resonant)  
 (e) Measured by ASTM E1461

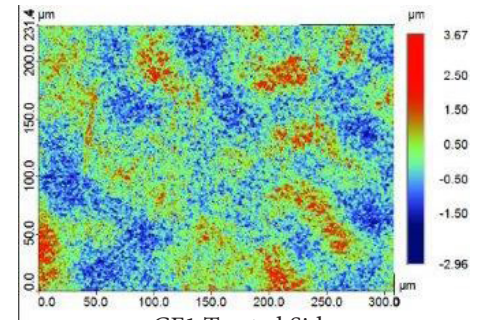
\*CTE values vary by temperature range of measurement. Please inquire for specific product temperature range.

UL Rating for all products: 94 V-O except products designated with <sup>‡</sup>

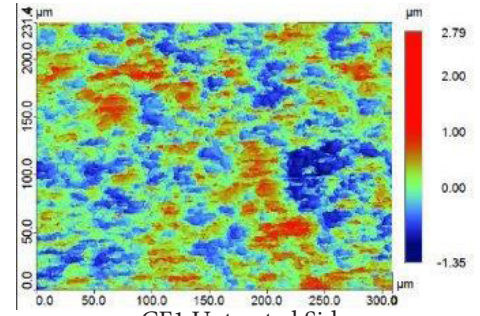
<sup>†</sup> Unclad    <sup>††</sup> 1 oz. copper

## Copper Cladding (Bruker Optical Measurement)

Copper Designation	Surface Roughness $R_{MS}$ Treated side		Surface Roughness $R_{MS}$ Untreated side		Description
	Microinches	Microns	Microinches	Microns	
ULPH	*Comparable to rolled copper - see scanning electron microscope images below				Ultra Low Profile ½ oz
ULP1					Ultra Low Profile 1 oz
RH	15	0.37	12	0.31	Rolled-Annealed ½ oz
R1	11	0.28	9	0.24	Rolled-Annealed 1 oz
CFH	29	0.74	13	0.34	HVLP Electrodeposited ½ oz
CF1	27	0.69	16	0.40	HVLP Electrodeposited 1 oz
CLH	46	1.16	44	1.12	Reverse Treated Electrodeposited ½ oz
CL1	39	1.00	52	1.31	Reverse Treated Electrodeposited 1 oz
CH (CVH)	66	1.68	18	0.46	High Ductility Very Low Profile Electrodeposited ½ oz
C1 (CV1)	60	1.54	19	0.49	High Ductility Very Low Profile Electrodeposited 1 oz



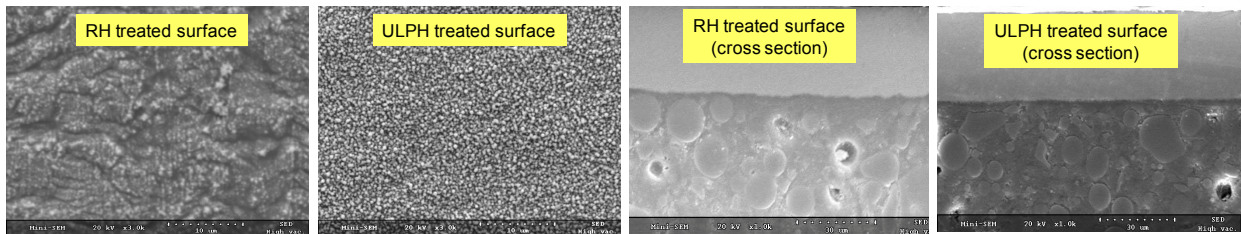
CF1 Treated Side



CF1 Untreated Side

OhmegaPly®, Ticer® and other resistive foils available upon request. Please contact Taconic for availability. OhmegaPly® is a registered trademark of Ohmega Technologies, Inc. Ticer® is a registered trademark of Ticer Technologies.

½ oz. copper = 0.7 mils or 17.5 microns  
 1 oz. copper = 1.4 mils or 35.0 microns  
 2 oz. and other coppers available upon request.



\*Optical measurements are not accurate to characterize the differences between ULP and rolled coppers. Scanning electron microscope analysis shows a very comparable surface roughness. Insertion loss comparisons are available by request.

## Heavy Metal Cladding - Available Upon Request

Heavy Metal	Specific Gravity $g/cm^3$	Thermal Conductivity $W/M^*K$	CTE $ppm/^*C$	Machinability
Copper	8.9	390	17	Good
Aluminum	2.7	180	24	Fair

fastRise™ Prepreg	Product	Nominal Dk (10 GHz)	DK Tolerance + / -	Pressed Thickness <sup>1</sup> (mil)	Pressed Thickness <sup>1</sup> (mil) 0.5 oz. Cu	Pressed Thickness <sup>1</sup> (mil) 1 oz. Cu	Typical Flow %
	FR-25-0021-45	2.43	0.04	2.1 +/- 0.10	1.9	1.5	10 (7.5 - 12.5)
	FR-25-0021-45F	2.45	0.04	2.1 +/- 0.15	1.9	1.5	2 (1 - 4)
	FR-26-0025-60	2.52	0.04	2.77 +/- 0.10	2.5	2.1	11 (8 - 14)
	FR-27-0030-25	2.70	0.04	3.6 +/- 0.20	3.2	2.8	3.6 (2 - 5)
	FR-27-0035-66	2.62	0.04	3.98 +/- 0.15	3.6	3.2	15 (12 - 18)
	FR-27-0040-43F	2.77	0.04	4.1 +/- 0.25	3.8	3.5	3 (1.5 - 4.5)
	FR-27-0042-75	2.68	0.04	5.0 +/- 0.35	4.7	4.3	(20 - 40)*
	FR-27-0045-35	2.74	0.04	5.6 +/- 0.40	5.2	4.8	7 (5 - 10)
	FR-28-0040-50 (S)	2.74 (2.76)	0.04	4.7 +/- 0.35	4.1	3.7	10 (7.5 - 12.5)
	FR-27-0050-40 (S)	2.74 (2.70)	0.04	6.0 +/- 0.40	5.6	5.2	11 (7 - 15)

0.5 oz. Cu, 50% removal

1 oz. Cu, 50% removal

\* Insufficient data

## Common Thicknesses & Tolerances

Additional thicknesses & tolerances are available upon request

Product	Available Thickness		Thickness Tolerance	
	(inches)	(mm)	(inches)	(mm)
TLY-3, 5, 5A	0.0035	0.09		
	0.0050 (TLY-3, 5)	0.13	+/- 0.0005	+/- 0.01
	0.0100	0.25	+/- 0.0007	+/- 0.02
	0.0200	0.51	+/- 0.0020	+/- 0.05
	0.0310	0.79	+/- 0.0020	+/- 0.05
	0.0620	1.58	+/- 0.0020	+/- 0.05
TLX (TLT)-6, 7, 8, 9, 0	0.0017	0.04		
	0.0050	0.13	+/- 0.0005	+/- 0.01
	0.0100	0.25	+/- 0.0007	+/- 0.02
	0.0200	0.51	+/- 0.0020	+/- 0.05
	0.0310	0.79	+/- 0.0020	+/- 0.05
	0.0620	1.58	+/- 0.0020	+/- 0.05
TLA-6	0.0300	0.76	+/- 0.0020	+/- 0.05
	0.0570	1.45	+/- 0.0020	+/- 0.05
TLE-95	0.0015	0.04	+/- 0.0002	+/- 0.005
	0.0035	0.09	+/- 0.00025	+/- 0.006
	0.0052	0.13	+/- 0.0005	+/- 0.01
	0.0100	0.25	+/- 0.0007	+/- 0.02
TLC-30, 32	0.0200	0.51	+/- 0.0020	+/- 0.05
	0.0310	0.79	+/- 0.0020	+/- 0.05
	0.0450	1.14	+/- 0.0020	+/- 0.05
	0.0620	1.58	+/- 0.0020	+/- 0.05
	0.0930	2.36	+/- 0.0030	+/- 0.08
RF-30 RF-30A  *Only for RF-30	0.0100*	0.25	+/- 0.0007	+/- 0.02
	0.0200	0.51	+/- 0.0020	+/- 0.05
	0.0300	0.76	+/- 0.0020	+/- 0.05
	0.0400	1.02	+/- 0.0020	+/- 0.05
	0.0600	1.52	+/- 0.0020	+/- 0.05
EZ-IO, TSM-DS3, RF-60TC	0.0050	0.13	+/- 0.0005	+/- 0.013
	0.0100	0.25	+/- 0.0010	+/- 0.025
	0.0200	0.51	+/- 0.0020	+/- 0.05
	0.0300	0.76	+/- 0.0020	+/- 0.05
TLF-35A	0.0100	0.25	+/- 0.0010	+/- 0.025
	0.0200	0.51	+/- 0.0020	+/- 0.05
	0.0300	0.76	+/- 0.0020	+/- 0.05
	0.0600	1.52	+/- 0.0020	+/- 0.05

Product	Available Thickness		Thickness Tolerance	
	(inches)	(mm)	(inches)	(mm)
RF-35	0.0100	0.25	+/- 0.0007	+/- 0.02
	0.0200	0.51	+/- 0.0020	+/- 0.05
	0.0300	0.76	+/- 0.0020	+/- 0.05
	0.0600	1.52	+/- 0.0020	+/- 0.05
RF-35A2 RF-35TC	0.0050	0.13	+/- 0.0005	+/- 0.013
	0.0100	0.25	+/- 0.0010	+/- 0.025
	0.0200	0.51	+/- 0.0020	+/- 0.05
	0.0300	0.76	+/- 0.0020	+/- 0.05
RF-41	0.0600	1.52	+/- 0.0020	+/- 0.05
	0.1250	3.18	+/- 0.0035	+/- 0.09
RF-43	0.0100	0.25	+/- 0.0010	+/- 0.025
	0.0200	0.51	+/- 0.0020	+/- 0.05
	0.0300	0.76	+/- 0.0015	+/- 0.04
	0.0620	1.58	+/- 0.0020	+/- 0.05
RF-45	0.1250	3.18	+/- 0.0035	+/- 0.09
	0.0200	0.51	+/- 0.0020	+/- 0.05
	0.0310	0.79	+/- 0.0020	+/- 0.05
TRF-43	0.0620	1.58	+/- 0.0020	+/- 0.05
	0.1250	3.18	+/- 0.0035	+/- 0.09
	0.0080	0.20	+/- 0.0010	+/- 0.025
	0.0320	0.81	+/- 0.0020	+/- 0.05
RF-60A	0.0640	1.63	+/- 0.0035	+/- 0.09
	0.1200	3.05	+/- 0.0049	+/- 0.125
	0.0100	0.25	+/- 0.0010	+/- 0.025
	0.0250	0.64	+/- 0.0020	+/- 0.05
Cer-10	0.0310	0.79	+/- 0.0020	+/- 0.05
	0.0500	1.27	+/- 0.0030	+/- 0.08
	0.0600	1.52	+/- 0.0030	+/- 0.08
	0.1250	3.18	+/- 0.0040	+/- 0.10
	0.0110	0.28	+/- 0.0010	+/- 0.025
	0.0250	0.64	+/- 0.0020	+/- 0.05
Cer-10	0.0300	0.76	+/- 0.0020	+/- 0.05
	0.0470	1.19	+/- 0.0030	+/- 0.08
	0.0620	1.58	+/- 0.0030	+/- 0.08
	0.1250	3.18	+/- 0.0040	+/- 0.10

Standard Sizes (Additional Sizes Available)			
Typical Size		Long Laminates	
Inches	mm	Inches	mm
36 W x 48 L	914 W x 1220 L	36 W x 60 L 36 W x 76 L 36 W x 102 L	914 W x 1524 L 914 W x 1930 L 914 W x 2590 L

All reported values are typical and should not be used for specification purposes. In all instances the user shall determine suitability in any given application. The above information creates no express or implied warranties.

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