

## Base Material for High Power RF Applications

### Benefits

- High DK for RF circuit size reduction
- Excellent dimensional stability
- Tight DK tolerance (10.2 +/- 0.3)
- Low 0.0025 loss tangent (@ 10 GHz)
- High thermal conductivity for enhanced thermal management
- Excellent adhesion to smooth coppers
- Low X, Y, Z expansion
- Excellent price/performance ratio

### Applications

- Microstrip Patch Antennas
- GPS Antennas
- Passive Components (filters, couplers, power dividers)
- Aircraft Collision Avoidance Systems
- Satellite components



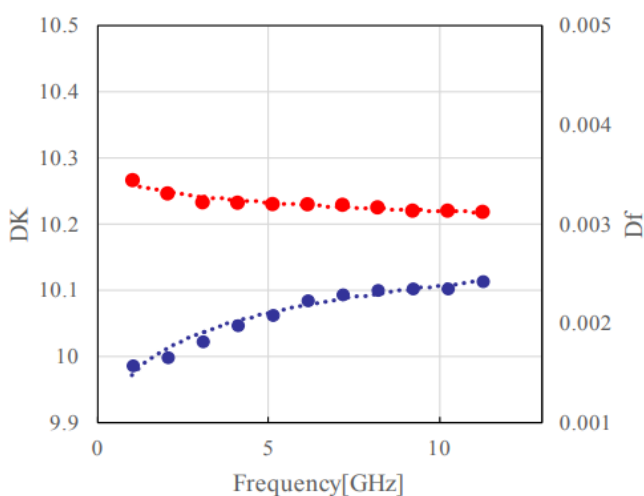
RF-10 copper clad laminates are composites of ceramic filled PTFE and woven fiberglass. RF-10 has the advantage of high dielectric constant and low dissipation factor. Thin woven fiberglass reinforcement is used to offer both low dielectric loss and improved rigidity for ease of handling and improved dimensional stability for multilayer circuits.

RF-10 laminates are engineered to provide a cost effective substrate with industry acceptable delivery times. RF-10 responds to a need in RF applications for size reduction. RF-10 bonds well to smooth low profile copper. The low dissipation of RF-10 combined with the use of very smooth copper results in optimal insertion losses at higher frequency where skin effect losses play a substantial role.

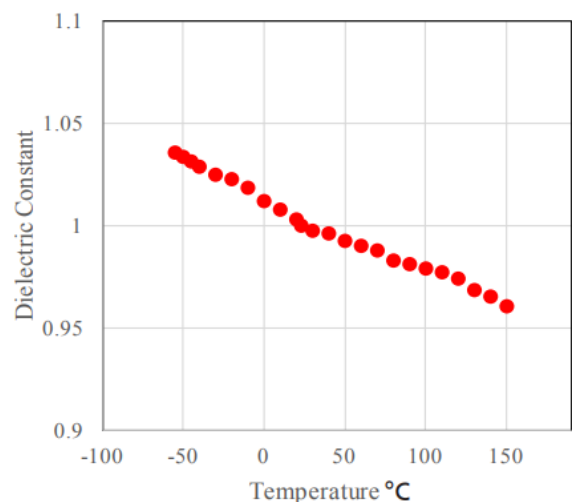
RF-10 can be sheared, drilled, milled and plated using standard PTFE circuit board processing techniques.

RF-10 laminates have low X, Y and Z thermal coefficients of expansion for exceptional plated through hole reliability and reduced scaling factors for artwork compensation.

DK / Df vs Frequency [GHz]



DK vs Temperature



Properties	Conditions	Typical Value	Unit	Test Method
<b>Electrical Properties</b>				
Dielectric Constant	@ 10 GHz	10.2 ± 0.3		IPC-650 2.5.5.5.1 Mod.
Dissipation Factor	@ 10 GHz	0.0025		IPC-650 2.5.5.5.1 Mod.
Surface Resistivity		1.0 x 10 <sup>8</sup>	Mohms	IPC-650 2.5.17.1
Volume Resistivity		6.0 x 10 <sup>7</sup>	Mohms/cm	IPC-650 2.5.17.1
<b>Thermal Properties</b>				
Thermal Conductivity	Unclad	0.85	W/M*K	IPC-650-2.4.50
CTE (RT- 150 °C)	X	16	ppm/°C	IPC-650 2.4.41
	Y	20		
	Z	25		
TcK† (-55 to 150 °C)		-370	ppm/°C	IPC-650 2.5.5.6
<b>Mechanical Properties</b>				
Flexural Strength	MD	96.53 (14,000)	N/mm <sup>2</sup> (psi)	IPC-650-2.4.4
	CD	68.95 (10,000)	N/mm <sup>2</sup> (psi)	
Tensile Strength	MD	62.57 (8,900)	N/mm <sup>2</sup> (psi)	IPC-650-2.4.19
	CD	37.26 (5,300)	N/mm <sup>2</sup> (psi)	
Dimensional Stability		-0.0032	% (25 mil-MD)	IPC-650 2.4.39 (After Etch)
		-0.0239	% (25 mil-CD)	
Dimensional Stability		-0.0215	% (25 mil-MD)	IPC-650 2.4.39 (After Bake)
		-0.0529	% (25 mil-CD)	
Dimensional Stability		-0.0301	% (25 mil-MD)	IPC-650 2.4.39 (After Stress)
		-0.0653	% (25 mil-CD)	
Dimensional Stability		-0.0027	% (60 mil-MD)	IPC-650 2.4.39 (After Etch)
		-0.0142	% (60 mil-CD)	
Dimensional Stability		-0.1500	% (60 mil-MD)	IPC-650 2.4.39 (After Bake)
		-0.0326	% (60 mil-CD)	
Dimensional Stability		-0.0167	% (60 mil-MD)	IPC-650 2.4.39 (After Stress)
		-0.0377	% (60 mil-CD)	
<b>Chemical / Physical Properties</b>				
Moisture Absorption		0.08	%	IPC-650 2.6.2.1
Peel Strength (1 oz. RT copper)		1.7	N/mm	IPC-650 2.4.8 (solder)
Density	Specific Gravity	2.77	g/cm <sup>3</sup>	IPC-650-2.3.5
Specific Heat		0.90	J/g°C	IPC-650-2.4.50
Flammability Rating		V-0		Internal

† TcK = Thermal Coefficient of DK

Typical Thicknesses <sup>1</sup>			
Inches	mm	Inches	mm
0.010	0.25	0.060	1.52
0.020	0.51	0.100	2.54
0.025	0.64	0.125	3.18
Available Sheet Sizes <sup>2</sup>			
Inches	mm	Inches	mm
12 x 18	305 x 457	18 x 24	457 x 610
16 x 18	406 x 457	36 x 48	914 x 1,220

\* All test data provided are typical values and not intended to be specification values. For review of critical specification tolerances, please contact a company representative directly.

\* RF-10 can be manufactured in increments of 0.005" (0.125mm).

\* Standard panel size is 18" x 24" (457 mm x 610 mm).

\* Please contact AGC for availability of additional thicknesses, other sizes & any other type of cladding.

