AGC
Your Dreams, Our Challenge

TACONIC

RF-35TC Thermally Conductive Low Loss Laminate

RF-35TC offers a "best in class" low dissipation factor with high thermal conductivity. This material is best suited for high power applications where every 1/10th of a dB is critical and the PWB substrate is expected to diffuse heat away from both transmission lines and surface mount components such as transistors or capacitors. RF-35TC is a PTFE based, ceramic filled fiberglass substrate. It will not oxidize, yellow or show upward drift in dielectric constant and dissipation factor like its synthetic rubber (hydrocarbon) competitors.

The low Z axis CTE and temperature stable Dk are critical for both narrow band and broad band overlay couplers. The low X and Y CTE values are crucial for maintaining critical distances between trace elements in a printed filter. The extremely low Df of 0.0011 and high thermal conductivity are particularly suited for power amplifier applications.

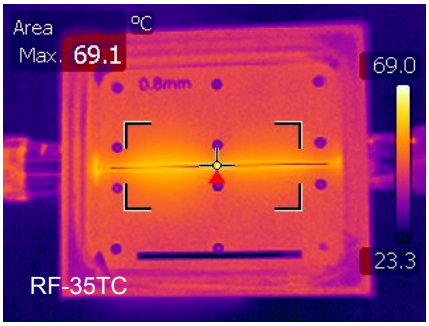
RF-35TC bonds very well to low profile copper, further reducing insertion loss.

Like most material properties, there are many techniques for measuring thermal conductivity. Thermal conductivity measured on an unclad sample (no copper) offers the true thermal conductivity of the laminate. Measurements on a copper clad laminate typically yield higher values as the copper clad laminate offers the least thermal resistance at the interface between the laminate and measuring equipment. When measured with or without copper cladding, RF-35TC has a state-of-the-art thermal conductivity. However, the low dissipation factor differentiates RF-35TC from the competition.

Benefits & Applications:

- "Best in Class" Loss Tangent
- Exceptional Thermal Management
- Dk Stability Across a Broad Temperature Range
- Enhanced Antenna Gains/ Efficiencies
- Excellent Adhesion to Very Low Profile copper

- Filters, Couplers & Power Amplifiers
- Antennas
- Satellites



Thermal image of 0603 capacitor at the center of a microstrip (47pF/250V/ C0G) assembled on RF-35TC under 200 watts applied power.

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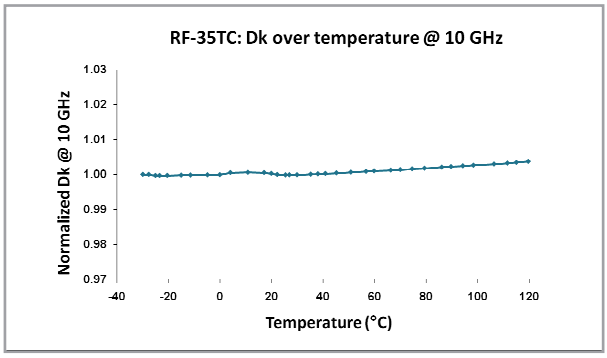
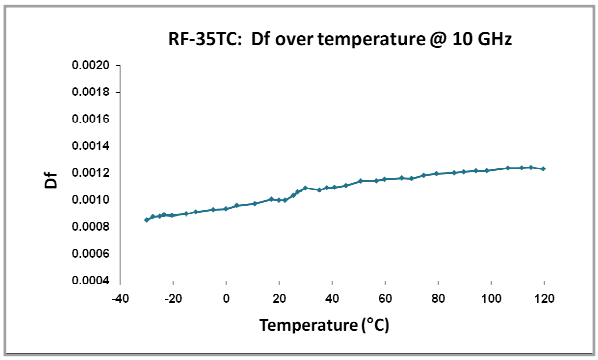
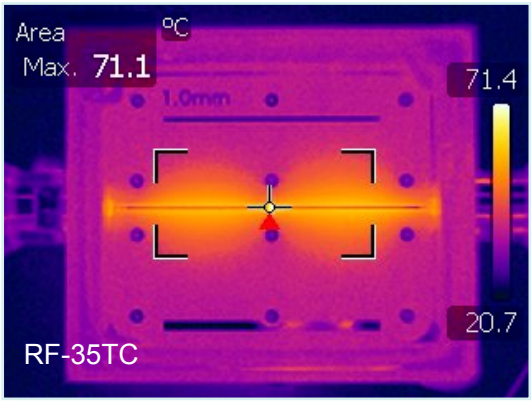
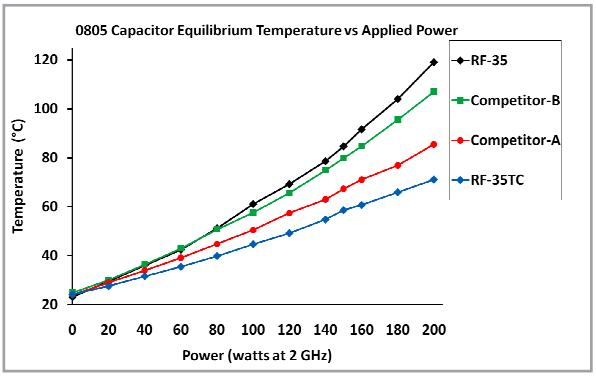




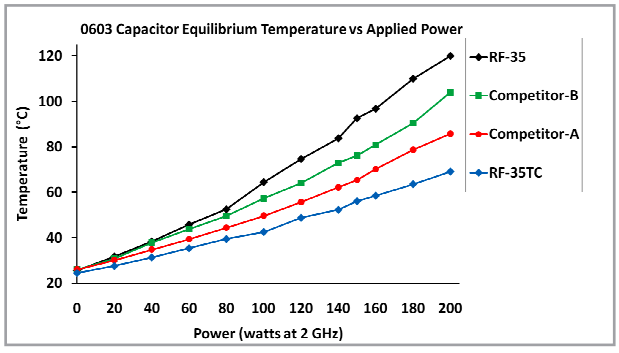
RF-35TC offers superior heat dissipation performance compared to competitive materials through a combination of exceptional thermal conductivity and "best in class" low dielectric loss.



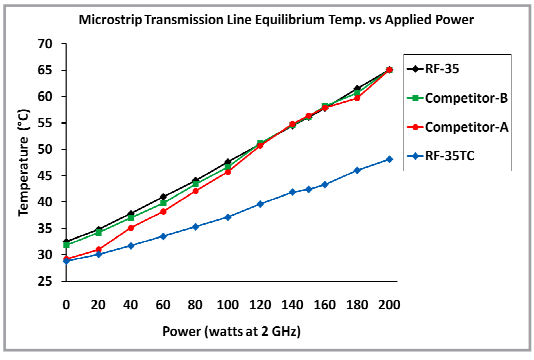
Thermal image of a microstrip transmission line with 0805 capacitor at center (47pF/250V/C0G) assembled on RF-35TC under 200 watts applied power.



Maximum temperature as a function of applied power for a microstrip and 0805 capacitor assembled on RF-35TC, RF-35 and two competitive materials.



Maximum temperature as a function of applied power for a microstrip and 0603 capacitor assembled on RF-35TC, RF-35 and two competitive materials.



Maximum temperature as a function of applied power for a microstrip transmission line assembled on RF-35TC, RF-35 and two competitive materials.

RF-35TC Typical Values					
Property	Test Method	Unit	Value	Unit	Value
Dk @ 10 GHz	IPC-650 2.5.5.5.1 (Modified)		3.50		3.50
T_cK (-30 to 120 °C)	IPC-650 2.5.5.5.1 (Modified)	ppm	24	ppm	24
Df @ 10 GHz	IPC-650 2.5.5.5.1 (Modified)		0.0011		0.0011
Dielectric Breakdown	IPC-650 2.5.6 (In-Plane,Two Pins in Oil)	kV	56.7	kV	56.7
Dielectric Strength	ASTM D 149 (Through Plane)	V/mil	570	V/mm	22,441
Arc Resistance	IPC-650 2.5.1	Seconds	304	Seconds	304
Moisture Absorption	IPC-650 2.6.2.1	%	0.05	%	0.05
Flexural Strength (MD)	ASTM D 790 / IPC-650 2.4.4	psi	12,900	N/mm^2	88.94
Flexural Strength (CD)	ASTM D 790 / IPC-650 2.4.4	psi	11,700	N/mm^2	80.67
Tensile Strength (MD)	ASTM D 3039 / IPC-TM-650 2.4.19	psi	9,020	N/mm^2	62.19
Tensile Strength (CD)	ASTM D 3039 / IPC-TM-650 2.4.19	psi	7,740	N/mm^2	53.37
Elongation at Break (MD)	ASTM D 3039 / IPC-TM-650 2.4.19	%	1.89	%	1.89
Elongation at Break (CD)	ASTM D 3039 / IPC-TM-650 2.4.19	%	1.70	%	1.70
Young's Modulus (MD)	ASTM D 3039 / IPC-TM-650 2.4.19	psi	667,000	N/mm^2	4,599
Young's Modulus (CD)	ASTM D 3039 / IPC-TM-650 2.4.19	psi	637,000	N/mm^2	4,392
Poisson's Ratio (MD)	ASTM D 3039 / IPC-TM-650 2.4.19		0.18		0.18
Poisson's Ratio (CD)	ASTM D 3039 / IPC-TM-650 2.4.19		0.23		0.18
Compressive Modulus	ASTM D 695 (23 °C)	psi	560,000	N/mm^2	3,861
Flexural Modulus (MD)	ASTM D 790 / IPC-650 2.4.4	psi	1.46 $x10^6$	N/mm^2	10,309
Flexural Modulus (CD)	ASTM D 790 / IPC-650 2.4.4	psi	1.50 x 10^6	N/mm^2	10,076
Peel Strength (½ oz CVH)	IPC-650 2.4.8 (Thermal Stress)	lbs/in	7	N/mm	1.25
Thermal Conductivity (Unclad, 125 °C)	ASTM F433 (Guarded Heat Flow)	W/M*K	0.60	W/M*K	0.60
Thermal Conductivity (C1/C1, 125 °C)	ASTM F433 (Guarded Heat Flow)	W/M*K	0.92	W/M*K	0.92
Thermal Conductivity (CH/CH, 125 °C)	ASTM F433 (Guarded Heat Flow)	W/M*K	0.87	W/M*K	0.87
Dimensional Stability (MD)	IPC-650-2.4.39 Sec. 5.4 (After Etch)	mils/in	0.23	mm/M	0.23
Dimensional Stability (CD)	IPC-650-2.4.39 Sec. 5.4 (After Etch)	mils/in	0.64	mm/M	0.64
Dimensional Stability (MD)	IPC-650-2.4.39 Sec. 5.5 (Thermal Stress)	mils/in	-0.04	mm/M	-0.04
Dimensional Stability (CD)	IPC-650-2.4.39 Sec. 5.5 (Thermal Stress)	mils/in	0.46	mm/M	0.46
Surface Resistivity	IPC-650 2.5.17.1 (After Elevated Temp.)	Mohms	8.33 x 10^7	Mohms	8.33 x 10^7
Surface Resistivity	IPC-650 2.5.17.1 (After Humidity)	Mohms	6.42 x 10^7	Mohms	6.42 x 10^7
Volume Resistivity	IPC-650 2.5.17.1 (After Elevated Temp.)	Mohms/cm	5.19 x 10^8	Mohms/cm	5.19 x 10^8
Volume Resistivity	IPC-650 2.5.17.1 (After Humidity)	Mohms/cm	2.91 x 10^8	Mohms/cm	2.91 x 10^8
CTE (X axis) (23 to 125 °C)	IPC-650 2.4.41 / ASTM D 3386	ppm/°C	11	ppm/°C	11
CTE (Y axis) (23 to 125 °C)	IPC-650 2.4.41 / ASTM D 3386	ppm/°C	13	ppm/°C	13
CTE (Z axis) (23 to 125 °C)	IPC-650 2.4.41 / ASTM D 3386	ppm/°C	34	ppm/°C	34
Density	ASTM D 792	g/cm^3	2.35	g/cm^3	2.35
Hardness	ASTM D 2240 (Shore D)		79.1		79.1
Strain at Break (MD)	ASTM D 790 / IPC-650 2.4.4	%	0.014	%	0.014
Strain at Break (CD)	ASTM D 790 / IPC-650 2.4.4	%	0.013	%	0.013
Specific Heat	ASTM E 1269-05, E 967-08, E 968-02	J/(g °C)	0.940	J(g °C)	0.940
T_d (2% Wt. Loss)	IPC-650 2.4.24.6/TGA	°F	788	°C	420
T_d (5% Wt. Loss)	IPC-650 2.4.24.6/TGA	°F	817	°C	436

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.

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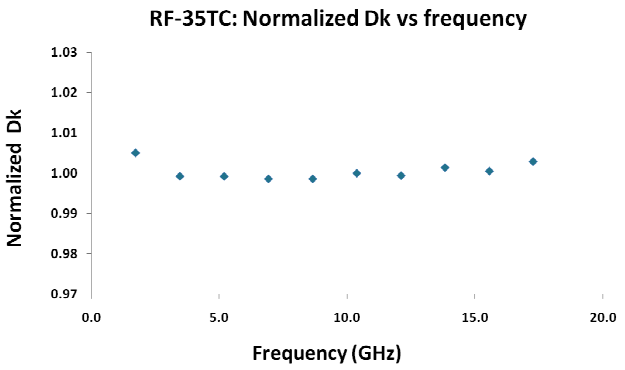
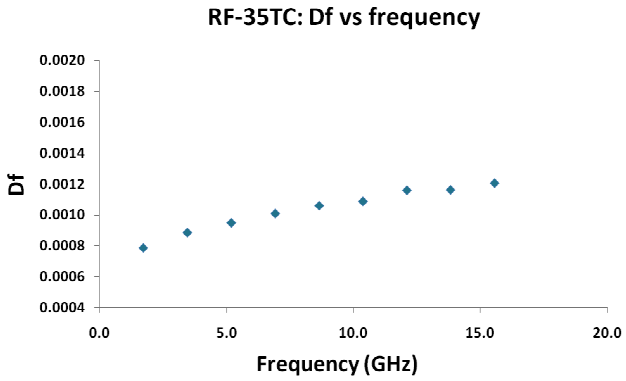
Designation	Dielectric Constant
RF-35TC	3.50 ± 0.05

Typical Thicknesses	
Inches	mm
0.0050	0.13
0.0100	0.25
0.0200	0.51
0.0300	0.76
0.0600	1.52

Available Sheet Sizes	
Inches	mm
12 x 18	305 x 457
16 x 18	406 x 457
18 x 24	457 x 610
16 x 36	406 x 914
24 x 36	610 x 914





Please see our Product Selector Guide for Information on available copper cladding.

An example of our part number is: **RF-35TC-0300-C1/C1- 18" x 24" (457 mm x 610 mm)**