

# HF-350FTC

## Thermally Enhanced Thermoset Composite



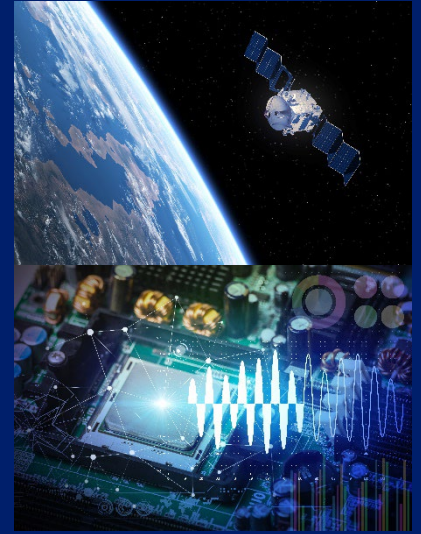
Your Dreams, Our Challenge

### Benefits

- Enhanced Power Handling Capability with Good Thermal Conductivity (0.8 W/M\*K)
- Low Electrical/Insertion Loss for Microwave Applications
- Better Oxidation Resistance
- Stable Dielectric Properties vs. Temperature & Frequency
- Controllable DK and Impedance
- Dimensionally Stable
- Thermoset Resin
- Flame Retardant
- Excellent Reliability

### Applications

- Power Amplifier
- Power Divider/Filter/Coupler
- Broadcast/Satellite
- Aerospace Components

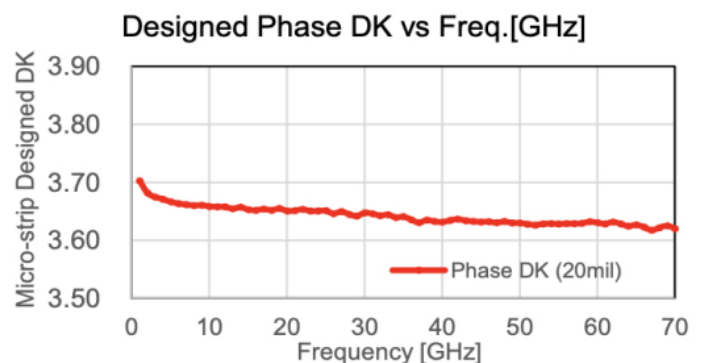
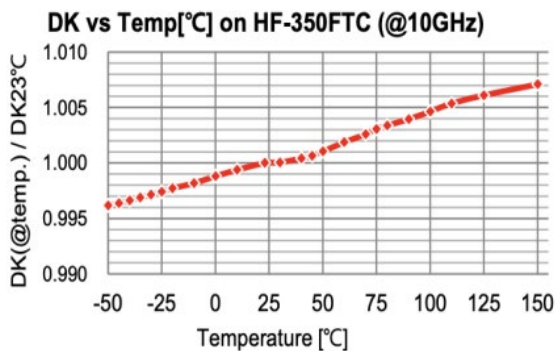


HF-350FTC is a flame retardant copper clad dielectric substrate based on ceramic filled hydrocarbon and reinforced woven fiberglass. The ceramic based composite has been optimized for low signal loss at high frequency and high thermal conductivity.

The higher thermal conductivity of HF-350FTC can help both efficiently radiate the heat and carry thermal energy away from localized hot spots. The lower dielectric dissipation factor helps reduce heat generated along the transmission line from the dielectric material. These factors provide a higher power handling capability resulting in lower operating temperatures and possibly lower warranty costs. The additional design margin in thermal management might also lead to improved reliability at soldered connections.

Traditional thermosetting substrates can be prone to oxidation with time and temperature. Oxidation of the dielectric material can result in changes in color, increased dissipation factor and a shift higher in dielectric constant. HF-350FTC has been designed and optimized for resistance to oxidation.

HF-350FTC can be fabricated using standard FR-4 processes without special via hole preparation. The thermal and mechanical properties of HF-350FTC yield robust and reliable hybrid multilayer constructions in increasingly higher frequency, higher density emerging RF/digital applications.



Properties	Conditions	Typical Value	Unit	Test Method
<b>Electrical Properties</b>				
Dielectric Constant	@ 10 GHz	3.55		IPC-650 2.5.5.5.1 Mod.
Designed DK(20 mil)	@ 10 GHz	3.64		MS Differential Phase Length
Dissipation Factor	@ 10 GHz	0.0029		IPC-650 2.5.5.5.1 Mod.
Volume Resistivity		2.2 x 10 <sup>10</sup>	Mohm/cm	IPC-650 2.5.17.1
Surface Resistivity		1.7 x 10 <sup>10</sup>	Mohm	IPC-650 2.5.17.1
<b>Thermal Properties</b>				
Thermal Conductivity	Unclad	0.80	W/M*K	IPC-650 2.4.50
CTE (50 to 150 °C)	X	14	ppm/°C	IPC-650 2.4.41
	Y	16		
	Z	70		
TcK (-50 to 150 °C)		55	ppm/°C	IPC-650 2.5.5.5
T <sub>d</sub>	2% wt. loss	372 (702)	°C (°F)	IPC-650 2.4.24.6/TGA
	5% wt. loss	386 (727)	°C (°F)	
T <sub>g</sub>		>280 (>536)	°C (°F)	IPC-650 2.4.24
<b>Mechanical Properties</b>				
Peel Strength	1 oz. RCC Copper	1.2 (7.0)	N/mm (lbs/in)	IPC-650 2.4.8 (Solder)
Flexural Strength	MD	20,000	psi	IPC-650 2.4.4
	CD	16,000	psi	
Tensile Strength	MD	16,000	psi	IPC-650 2.4.18.3
	CD	13,000	psi	
Dimensional Stability	MD	-0.010	%	IPC-650 2.4.39 (After Etch)
	CD	-0.009	%	
	MD	-0.057	%	IPC-650 2.4.39 (After Bake)
	CD	-0.055	%	
	MD	-0.062	%	IPC-650 2.4.39 (After Stress)
	CD	-0.063	%	
<b>Chemical / Physical Properties</b>				
Moisture Absorption		0.08	%	IPC-650 2.6.2.1
Density	Specific Gravity	1.91	g/cm <sup>3</sup>	IPC-650 2.3.5
Specific Heat		0.84	J/g°C	IPC-650 2.4.50

- \* 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.
- \* HF-350FTC 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.

