

HF-341 Thermoset Composite for RF Microwave Design

HF-341 copper clad laminate is a ceramic-filled hydrocarbon based resin composite reinforced with woven fiberglass. The special ceramic-filled hydrocarbon composite offers superior RF microwave performance and high temperature stability in power amplifier applications.

HF-341 bonds well to reverse treated copper with a smooth profile. The low loss dielectric properties combined with the use of smooth RTF copper results in lower insertion loss at higher frequency. These benefits lead to higher signal gain and optimized signal to noise ratio.

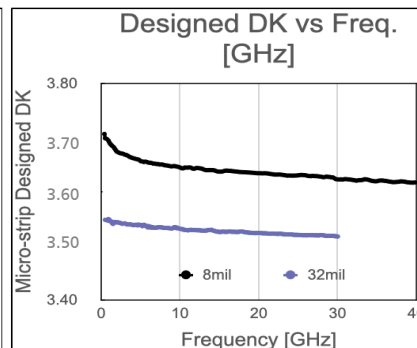
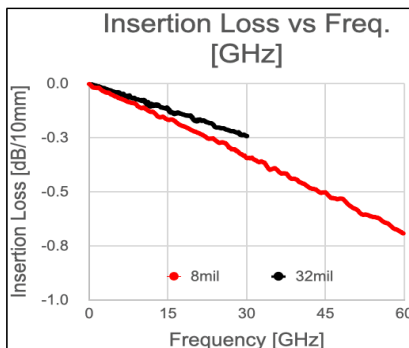
Traditional thermoset laminates can degrade over time by oxidation with time and elevated temperatures. Oxidation is permanent and leads to a shift toward a higher dielectric constant, elevated loss values, and changing color. The impact of shifting dielectric properties depends on circuit design, operating power, and use temperature. HF-341 has been developed with much better resistance to oxidation. The very low moisture absorption of HF-341 yields a composite with very stable RF properties over time and temperature.

HF-341 can be fabricated using standard FR-4 PCB processing without special plated through hole preparation. HF-341 is especially suited for multilayer applications due to its low Z axis expansion of 45 ppm/°C.

HF-341 is a highly engineered composite designed to meet the demands of high volume RF microwave applications.

Benefits & Applications:

- Low DF/Insertion Loss
 - Controlled DK & Impedance
 - Enhanced Oxidation Resistance
 - Stable Dielectric Properties over Temperature and Frequency
 - Low Moisture Absorption
 - Low CTE for Multilayer Applications
 - Dimensionally Stable
 - Excellent PIMD Performance
 - High Performance / Price Ratio
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- Power Amplifier
 - LNA / LNB
 - ETC Antenna
 - RFIC
 - Passive Components (Dividers, Filters, Couplers, Up/Down Converter)



HF-341 Offers Superior RF Performance Over Frequency

1 oz. RTF Copper has been used for Insertion Loss measurement.

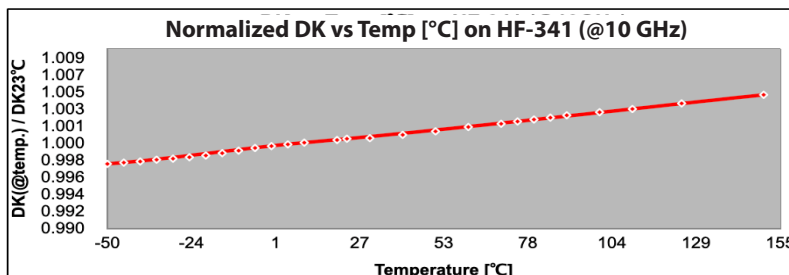
Designed DK measured by Micro-strip Differential Phase Length.

For HF-341 – 32 mil products, 50Ω impedance line width is wider than λ/4 from 20~30GHz.

HF-341 Typical Values					
Property	Test Method	Unit	Value	Unit	Value
Dk @ 10 GHz	IPC-650 2.5.5.5.1 Mod.		3.45 ± 0.05		3.45 ± 0.05
Designed DK (32 mil)	MS Differential Phase Length		3.53		3.53
Df @ 2 GHz	IPC-650 2.5.5.5.1 Mod.		0.0019		0.0019
Df @ 10 GHz	IPC-650 2.5.5.5.1 Mod.		0.0025		0.0025
TcK (-50 to 150 °C)	IPC-650 2.5.5.5	ppm/°C	+38	ppm/°C	+38
Moisture Absorption	IPC-650 2.6.2.1	%	0.04	%	0.04
Peel Strength (1 oz. RTF copper)	IPC-650 2.4.8 (Solder)	lbs/in	5	N/mm	0.9
Volume Resistivity	IPC-650 2.5.17.1	Mohm/cm	1.1 x 10 ⁹	Mohm/cm	1.1 x 10 ⁹
Surface Resistivity	IPC-650 2.5.17.1	Mohm	8.5 x 10 ⁸	Mohm	8.5 x 10 ⁸
Dimensional Stability	IPC-650 2.4.39 (After Etch)	% (MD)	-0.008	% (CD)	-0.005
Dimensional Stability	IPC-650 2.4.39 (After Bake)	% (MD)	-0.041	% (CD)	-0.026
Dimensional Stability	IPC-650 2.4.39 (After Stress)	% (MD)	-0.057	% (CD)	-0.044
Density (Specific Gravity)	IPC-650 2.3.5	g/cm ³	1.77	g/cm ³	1.77
Specific Heat	IPC-650 2.4.50	J/g°C	0.9	J/g°C	0.9
Thermal Conductivity (Unclad)	IPC-650 2.4.50	W/M*K	0.6	W/M*K	0.6
Electrical Strength	IPC-650 2.5.6.2	V/mil	750	KV/mm	30
T _d (2% wt. loss)	IPC-650 2.4.24.6/TGA	°F	761	°C	405
T _d (5% wt. loss)	IPC-650 2.4.24.6/TGA	°F	815	°C	435
CTE (X -Y axis) (50 to 150 °C)	IPC-650 2.4.41	ppm/°C	12-18	ppm/°C	12-18
CTE (Z axis) (50 to 150 °C)	IPC-650 2.4.41	ppm/°C	45	ppm/°C	45
T _g	IPC-650 2.4.24	°F	>536	°C	>280
Lead Free Process Compatible	Internal		Yes		Yes

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.

HF-341 Offers Very Stable Performance Over a Wide Temperature Range.



Dielectric layers of HF-341 are on the basis of hydrocarbon thermoset composite materials.

Standard HF-341 series can be manufactured in 0.004" (4 mil) increments starting with a minimum of 0.008" (8 mil). Please call for availability of additional thicknesses.

PIMD performance can be influenced by many factors including copper. Values were measured with 120mm circuit length on 60 mil dielectric materials with reverse treated copper foil.

Our Standard panel size is 18" x 24" (457mm X 610mm). Please call for availability of other sizes.

Please call for other types of cladding.

Standard Dielectric Thickness (mil)	Standard Panel Size	Standard Copper
16, 20, 32, 60 (available in 4 mil increments)	12" x 18", 18" x 24" 12" x 48", 36" x 48"	½ oz. Std./RTF ED Foil 1 oz. Std./RTF ED Foil

An example of 32 mil material with 1 oz. Reverse Treated Cu on both sides is part# :
HF-341-0320-CL1/CL1-18" x 24" (HF-341-0320-CL1/CL1-457mm x 610mm)

