

# ComClad™ HF

## High Frequency Circuit Material

ComClad HF high frequency circuit material consists of Noryl® plastic material as the base dielectric and has excellent electrical performance for use in microwave and RF applications. ComClad HF is especially attractive because of the combination of a dielectric constant of 2.6, a dissipation factor of .0025 and very low prices.

Because ComClad HF uses a common plastic as the base dielectric, designers and fabricators can form, mold, bend, and even insert-mold it in a plastic injection process.

ComClad HF is available in standard circuit board panel sizes of 12" x 18" and 18" x 24" with a variety of standard dielectric thicknesses and copper cladding. Sheldahl's flexible manufacturing also allows for custom designs of panel size, thickness and copper clad. The material processes through standard printed circuit board manufacturing operations.

ComClad HF is rated at continuous operating temperatures of -40°C - +85°C and can be SMT or through hole soldered with shielding fixtures to prevent direct heat contact to the material.

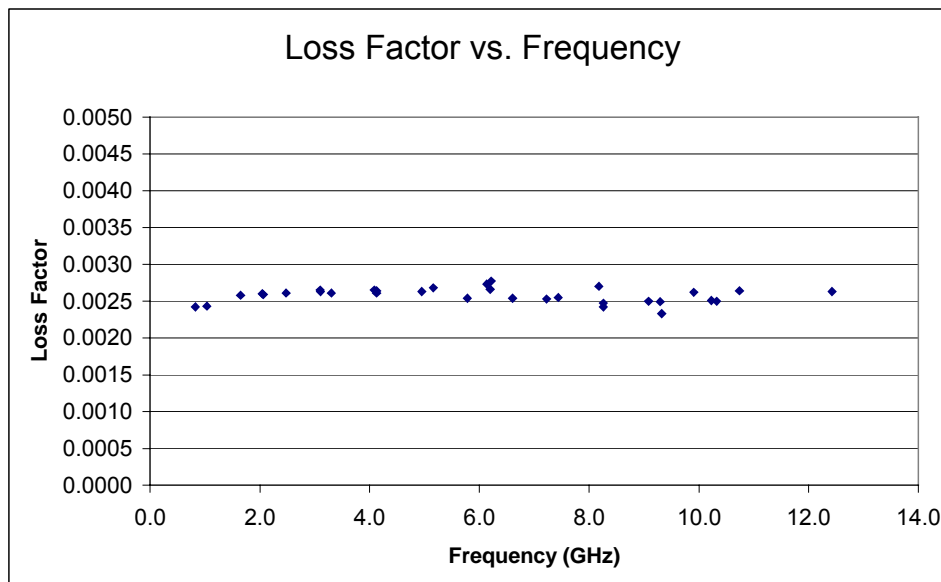
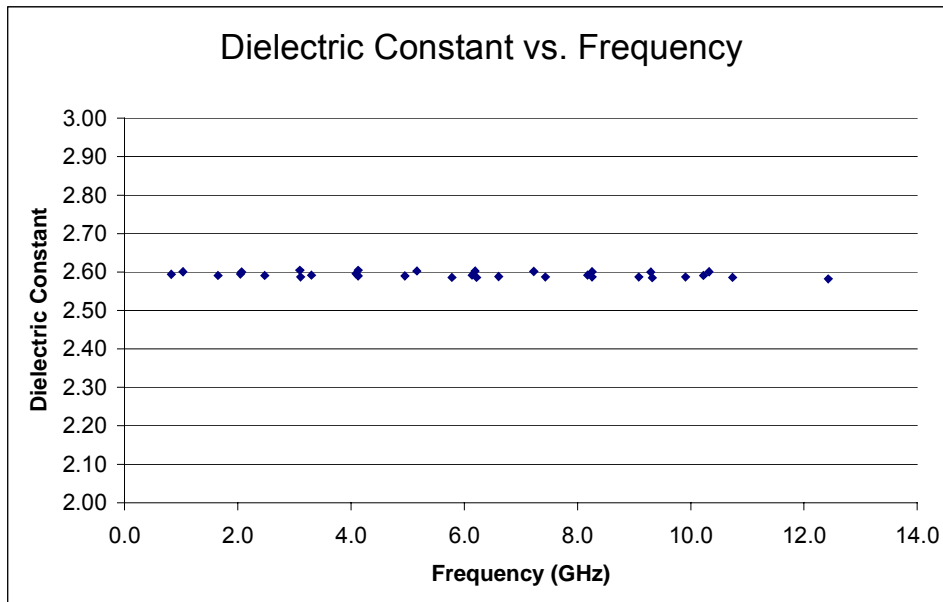
Applications for ComClad HF include cellular and PCS base stations, direct broadcast antennas, wireless LANs, antennas for various applications, automotive collision avoidance radar and three dimensional circuit boards.

ComClad HF is manufactured under a QS9000 and ISO9000 certified quality system

Noryl® is a registered trademark of the GE Corporation

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## ComClad HF Laminate Properties

Property	Typical Value	Units	Condition	Test Method
Dielectric Constant $\epsilon_r$	2.6 2.6	-	Ambient 48hr/50°C H <sub>2</sub> O	1-12 GHz Triplate-line resonator
Dissipation Factor $\tan \delta$	.0025 .0040	-	Ambient 48hr/50°C H <sub>2</sub> O	1-12 GHz Triplate-line resonator
Dimensional Stability	-0.1 -1.3	% %	IPC 2.4.13 30min 150°C	Method B (etch) Method C (total)
Volume Resistivity	$>10^{10}$	M $\Omega$	IPC 2.5.17.1	Rev A
Surface Resistivity	$>10^{10}$	M $\Omega$	IPC 2.5.17.1	Rev A
Tensile Modulus	$3.6 \times 10^5$	PSI	20°C, 10 rad/sec	RSA II
Water Absorption	0.07	%	IPC 2.6.2.1	Rev A
Copper Peel Strength	6.0	lbs/inch	90°	IPC 2.4.9B
Specific Heat	1.3	J/gm°C	25°C	DSC
Thermal Conductivity	.19	W/M°C	10x10x0.5 cm @ 27°C	
Coefficient of Thermal Expansion	59	PPM/°C	20-60°C	TMA
Glass Transition	140 <sub>TMA</sub>	°C	20-180°C, 10 rad/sec	RSA II
Density	1.08	gm/cm <sup>3</sup>	IPC 2.3.5	Rev B
UL Flammability Rating	94V-2		Thickness Dependent	UL

## ComClad HF Laminate Standard Configurations

Cladding: 1oz (35 $\mu$ m) Copper

Thickness: .020"  $\pm$  10% (.51mm  $\pm$  10%)  
.030"  $\pm$  10% (.76mm  $\pm$  10%)  
.060"  $\pm$  10% (1.52mm  $\pm$  10%)  
.090"  $\pm$  10% (2.29mm  $\pm$  10%)

Panels Sizes: 12" x 18" (305mm x 457mm)      Color:            Black  
18" x 24" (457mm x 610mm)

Contact Sheldahl for non-standard configurations. For more information visit Sheldahl's web page at [www.sheldahl.com](http://www.sheldahl.com) or contact Sheldahl at one of the phone numbers below or email at [comclad@sheldahl.com](mailto:comclad@sheldahl.com).

Sheldahl does not guarantee nor will it accept obligation or liability based on the use of this information or data and this does not provide any warranty, express or implied, including but not limited to warranty of merchantability or fitness for a particular use. Values will vary upon specific material construction. All data is subject to change without notice.

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