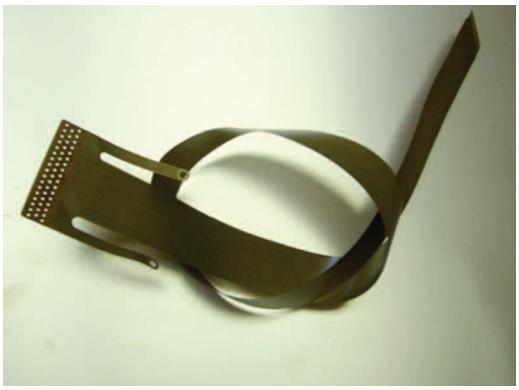
Microwave Journal



Low Loss, High Reliability, Thin Flexible Interconnect Materials

To meet the demands for high performance, flexible interconnects Taconic has introduced HyRelex, a new family of low loss, high reliability, flexible laminates and bonding materials, constructed with the benefits of reinforced high temperature polymer chemistry. The new materials provide excellent thermal, mechanical and electrical properties, as well as superior moisture resistance.

With its low dissipation factor, thermal stability and smooth surface profile, HyRelex minimizes phase shift with frequency and temperature changes, and yields exceptionally low loss circuit performance. ***Table 1*** lists its typical performance and properties values.

HyRelex laminates are typically ordered clad on both sides with 17 and 35 micron (1/2 and 1 oz.) rolled or electrodeposited copper. Among this material's outstanding properties is excellent peel strength to aid in high temperature assembly operations and high power handling requirements. HyRelex exhibits exceptional dimensional stability thus producing fine feature registration. HyRelex laminates exhibit flammability of V-0, with a thermal index rating (RTI) greater than 150°C. The materials are testing in accordance with IPC-TM 650.

TABLE I

HYRELEX TYPICAL VALUES

	TF-260	TF-290
Dielectric constant @10 GHz	2.60	2.90
Dissipation factor @10 GHz	0.0020	0.0028
Moisture absorption (%)	< 0.02	
Dielectric breakdown (kV)	> 60	
Volume resistivity (Mohm/cm)	10^7	
Surface resistivity (Mohm)	10^7	
Arc resistance (seconds)	> 180	
Flexural strength (MD) (psi)	> 23,000	> 35,000
Flexural strength (CD) (psi)	> 20,000	> 30,000
Peel strength (1 oz. VLP) (lbs/linear inch)	7	
Thermal conductivity (W/m/K)	0.20	
CTE (x-y) (ppm/°C)	9–12	
CTE (z) (%)	3	2
Flammability rating	V-0	

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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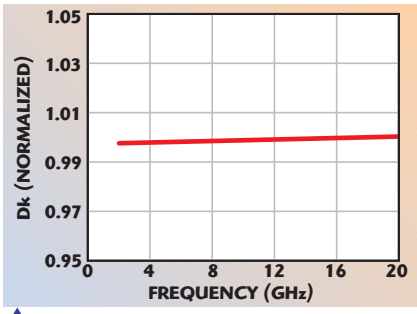

Fig. 1 Normalized dielectric constant vs. frequency.

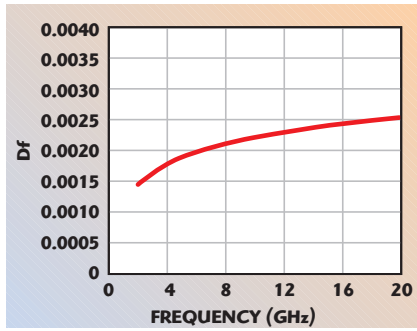

Fig. 2 Dissipation factor vs. frequency.

TacPreg® flexible bond-ply and cover-lay have been specifically designed to facilitate bonding of HyRelex TF laminates for flex and flex rigid multilayer applications. TacPreg flexible bond-ply is constructed with the base material used to produce HyRelex laminate coated with a flexible thermoset resin. TacPreg flexible cover-lay is constructed with a high temperature polymer film coated with a flexible thermoset resin on one side. These unique composites provide excellent chemical, moisture, high temperature and electrical performance properties with the processing advantages of a thermoset resin system. An additional advantage is the ability to closely match the dielectric constant of the bond-ply and cover-lay with HyRelex laminate.

Figures 1 and ***2*** show the HyRelex material's dielectric constant (Dk) and dissipation factor (Df) performance over the DC to 20 GHz frequency range. ***Figure 3*** shows insertion loss vs. frequency for the TF-260 and TF-290 materials.

Applications for HyRelex include double-sided, multilayer and rigid flex circuits used in high frequency

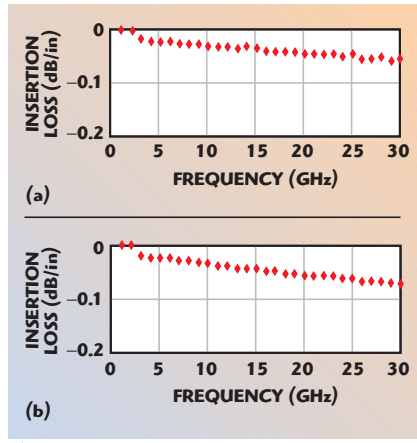

Fig. 3 Insertion loss vs. frequency; (a) TF-260 and (b) TF-290.

telecommunications, avionics, medical, automotive, military and consumer electronics. A Certificate of Conformance containing lot-specific data accompanies each shipment. Additional information may be obtained from the company's web site.

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